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Instruction Bulletin

ALTIVAR Drive Controllers in MCCs
NEMA Type 12 Enclosures

Class 8998

SQUARE D

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SECTION 1—INTRODUCTION

This instruction manual is applicable to Square D ALTIVAR adjustable speed drive controller units installed in NEMA Type 12 motor control center (MCC) enclosures only. Installation and maintenance information for Square D ALTIVAR adjustable speed drive controller units in NEMA Type 1 or Type 1 Gasketed (1A) MCC enclosures is contained in Square D documents 80442-291-01_ and 80442-507-01_.

Scope of Manual

This instruction manual provides supplementary installation and maintenance information for ALTIVAR adjustable speed drive controllers in Square D Class 8998 MCCs. Read the information provided in this manual in addition to all other documents shipped with the MCC.

Several features of the MCC ALTIVAR drive controller units require the instructions contained in this document in addition to the instructions for standard MCC units. The purpose of this document is to provide the user with the additional information necessary for installation and maintenance of the MCC drive controller units.

Documentation Set

Reference documents shipped with ALTIVAR drive controllers and Class 8998 MCCs include:

- Model 6 Motor Control Center Instruction Manual (8998IM9201_) or Model 5 Motor Control Center Installation and Maintenance Instruction Manual (8998IM9101_)

  NOTE: These two manuals are referred to in this document as "MCC instruction manual."
- ALTIVAR 66 Receiving, Installation, and Start-Up Instruction Manual (VD0C06S304_) or ALTIVAR 56 User's Manual (50006-519-01_)
- ALTIVAR 66 Level 1 and 2 Configuration Instruction Manual (VD0C06S305_)
- ALTIVAR 66 I/O Extension Module and Level 3 Configuration Instruction Manual (VD0C06T306_)

  NOTE: Included in package only if I/O extension module is provided.
- Drawings specific to the order

To replace missing documents, contact your local Square D field office.

Product Description

The Square D MCC ALTIVAR drive controller unit consists of a pre-engineered MCC unit with disconnect and an ALTIVAR AC drive controller for adjustable speed control of standard 3-phase asynchronous motors.

NEMA Type 12 MCC drive controller units differ from units designed for NEMA Type 1 MCCs in the thermal management system used to remove heat generated within the unit.

Frame Sizes 1, 2, and 3 are totally enclosed, non-ventilated units that provide greater integrity against contaminants. Frame Sizes 2 and 3 include a door-mounted heat exchanger to supplement cooling of the unit. Frame Sizes 4, 5, and 6 are totally enclosed and are duct ventilated. Air external to the MCC is forced through sealed and gasketed duct work integrated within the MCC drive controller units. The external air helps cool the heat sinks mounted on the drive controller and is exhausted out of the unit without contaminating the drive controller electronics or other connected MCC sections.

Each MCC drive controller unit contains current limiting fuses to achieve the short circuit rating of the unit. Various control and power contactor options may be included with the unit. Drawings shipped with the unit list all included options.

The ALTIVAR drive controller is factory set for use in most common applications. Many settings are programmed according to the power or control options ordered with the MCC drive controller unit and should not be adjusted. To adjust the drive controller for a particular installation, refer to the drawings included with the order and to the ALTIVAR 66 Level 1 and 2 Configuration Instruction Manual or ALTIVAR 56 User's Manual.

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SECTION 2—SAFETY PRECAUTIONS

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn OFF all power supplying this equipment before working on or inside this equipment.
- Always use a properly-rated voltage sensing device to confirm that all power is off.
- After disconnecting power, wait one minute before servicing a drive controller in order to allow the dc bus capacitors to discharge. After one minute, measure the DC bus capacitor voltage between the "+" and "-" terminals to verify that dc voltage is less than 45 Vdc. The DC bus LED is not an accurate indication of the absence of dc bus voltage. For additional information, refer to page 51 of the ALTIVAR 66 Receiving, Installation, and Start-Up Manual (VD0C06S304_) or ALTIVAR 56 User's Manual (50006-519-01_).
- Do not short across dc bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Many parts in the drive controller, including printed circuit boards, operate at line voltage. Do not touch. Use only electrically insulated tools.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to observe these instructions will result in death or serious injury.

NOTE: All personnel involved in handling, installation, testing, operation, and maintenance should be thoroughly familiar with the information in this instruction manual and the reference documents listed on page 1 of this manual before working on this equipment. Personnel must have a thorough understanding of electrical equipment in general, the specific operation of this particular equipment, and the types of severity of potential injury.

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SECTION 3—RECEIVING, HANDLING, AND STORAGE

⚠ WARNING

SHARP CORNERS

Avoid contact with the edges of the MCC heat exchanger unit.

Failure to observe this instruction can result in head injury or laceration.

⚠ CAUTION

HEAT EXCHANGER DAMAGE

- Do not allow objects to drop into and interfere with the rotation of the heat echanger fan.
- Do not mount or place objects above or below the heat exchanger, as these objects may block or interfere with the air flow.

Failure to observe these instructions can result in equipment damage.

Observe the following precautions for MCC drive controller units shipped to the site as a unit:

- Lifting units larger than 24 inches (610 mm) requires two or more people using special handling precautions and lifting devices.
- If lifting devices are used, refer to Figure 1 on page 4 for proper lifting points. Figure 2 on page 4 illustrates a lifting point that is NOT recommended for larger units or when using lifting devices.

Refer to the appropriate MCC instruction manual (Model 5 or Model 6) for information about receiving, handling, and storage.

Before installing MCC control units, locate and tighten any connections loosened during shipment and handling. Refer to the procedures in the Maintenance section of the appropriate MCC instruction manual.

A heat exchanger is mounted on the door of Frame Size 2 and 3 units (see Figure 18 on page 21). The heat exchanger protrudes 5.5 inches (139.7 mm) from the door. Follow these steps to avoid damaging the heat exchanger:

- Leave the protective wrapping on the heat exchanger until the MCC unit is ready for operation.
- Remove the protective wrapping from the heat exchanger before energizing the MCC.
- Avoid placing objects on top of the heat exchanger.
- Avoid placing the MCC unit in a location where collision with the heat exchanger will occur.
- Allow adequate work space around the heat exchanger when working near the MCC unit.

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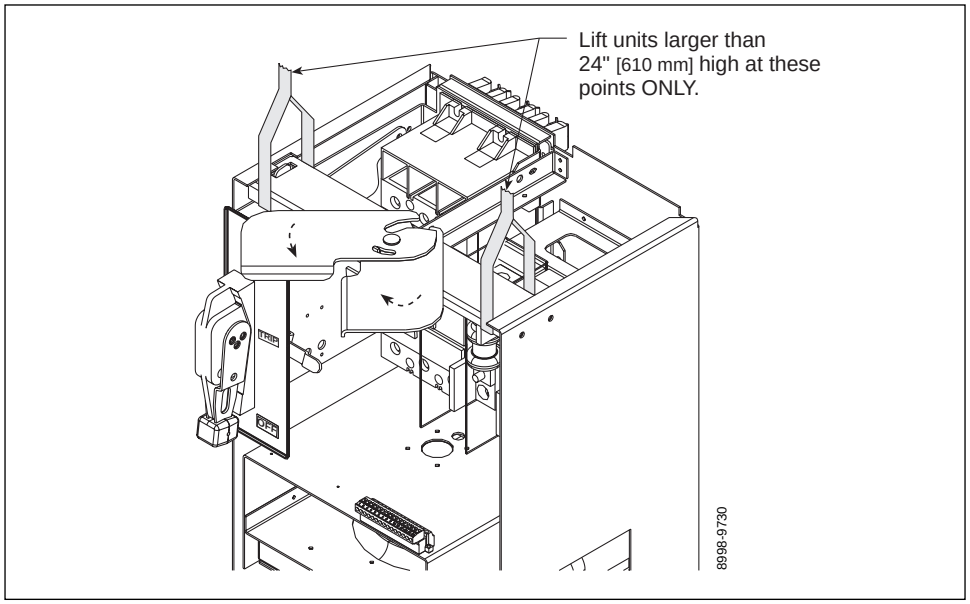

Figure 1: Lifting Method RECOMMENDED for MCC Drive Controller Units

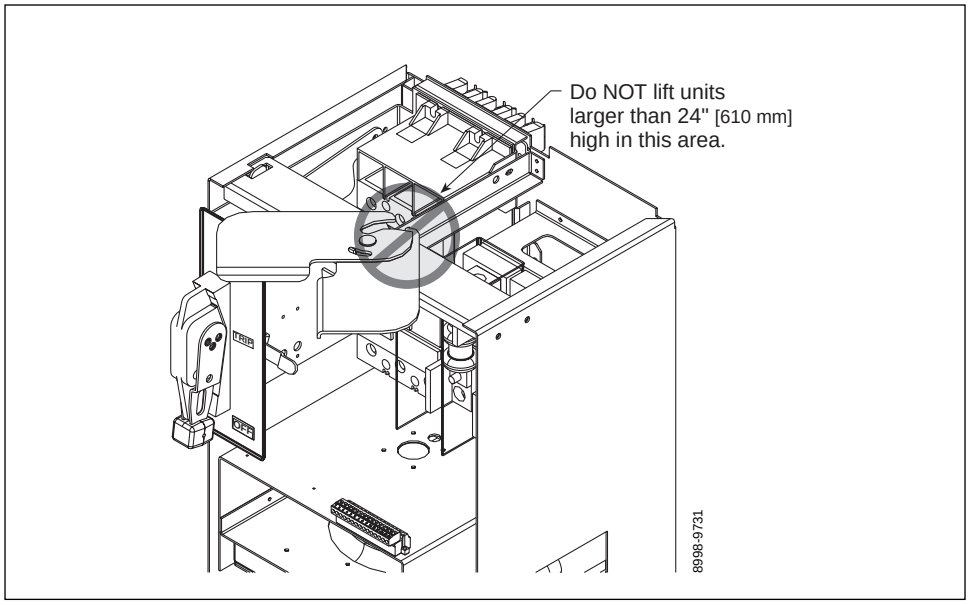

Figure 2: NOT a Recommended Lifting Method for MCC Drive Controller Units

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SECTION 4—INSTALLATION

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn OFF all power supplying this equipment before working on or inside this equipment.
- Always use a properly-rated voltage sensing device to confirm that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to observe these instructions will result in death or serious injury.

This section contains installation instructions specific to MCC ALTIVAR drive controller units. For installation instructions specific to other types of MCC units, refer to the installation section in the appropriate MCC instruction manual (Model 5 or Model 6).

NEMA Type 12 MCC enclosures are intended to provide a degree of protection against falling dirt, falling liquids, light splashing, airborne dust, airborne lint, airborne fibers, airborne flyings, and oil/coolant seepages. The MCC is rated to operate satisfactorily under NEMA Type 12 conditions in ambient temperatures between 32 °F and 104 °F (0 °C and 40 °C). The units covered by this manual should not be operated outside these conditions. Contaminants or temperatures exceeding these NEMA Type 12 ratings can cause nuisance tripping of the equipment.

Plug-on Unit Installation

For MCC drive controller plug-on unit installation, follow these steps:

1. Turn OFF all power supplying this equipment before working on or inside this equipment. Move the unit operating mechanism to the OFF position.
2. Install the drive unit door. Refer to the procedures in the Control Unit Removal section of the appropriate MCC instruction manual (Model 5 or Model 6).
3. Temporarily secure the keypad, control station plate, and associated wiring inside the unit.

   NOTE: Lifting units larger than 24 inches high (610 mm) requires two or more persons using special handling precautions. If lifting devices are used on an MCC drive controller unit, refer to Figure 1 on page 4, which illustrates proper lifting points. Figure 2 on page 4 illustrates a lifting point that is NOT recommended when lifting larger units.

4. Lift the unit and rest on the bottom shelf of the space in which the unit will be installed.
5. Align top shelf guides and unit guides. Slide the unit into the structure. Keep the sides even when sliding the unit into the structure to prevent binding.
6. When the unit is partially inside the structure, pull the twin-handle cam mechanism forward to open the slot between them (see Figure 24 on page 26).
7. Slide the unit into the structure until the twin-handle cam mechanism makes contact with the ratching pin in the shelf above the unit. Push both handles of the twin-handle cam mechanism until they are flush with the structure.
8. If the unit has a lock-in device (at the bottom of the unit) secure the device by turning its screw clockwise until the locking pawl pulls the unit bottom shelf flush with the structure (see Figure 22 on page 25).
9. Install the keypad and control station plate onto the doors with the hardware provided with the unit.

   NOTE: On units with two control station plates, a label is provided on each plate indicating the position the plate must occupy (upper or lower). Each control station plate must be installed in the position indicated by its label.

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10. Route the wires into the clip fasteners located on the inside of the door. Follow the wire routing instructions that are also located on the inside of the door.
11. **Frame Sizes 2 and 3 only:** connect the heat exchanger control power wiring by grasping the removable portion of the pull-apart terminal block and pushing down into the base of the terminal block mounted on the unit left side wall adjacent to the door (see Figure 21 on page 24).
12. Install the field control and power wiring (see Table 1 on page 12).
13. Close and secure the door with the quarter-turn fasteners.

Unit Identification

Installation is complete. Return the MCC to service.Unit identification and rating labels are on the inside wall of the MCC drive controller unit. See Figures 3-6 for label locations. Each ALTIVAR drive controller has a bar-coded rating label in the lower right corner of smaller horsepower drive controllers, or on the right side of larger horsepower drive controllers. This label contains, among other information, the ALTIVAR drive controller catalog number (for example, ATV••N4U).

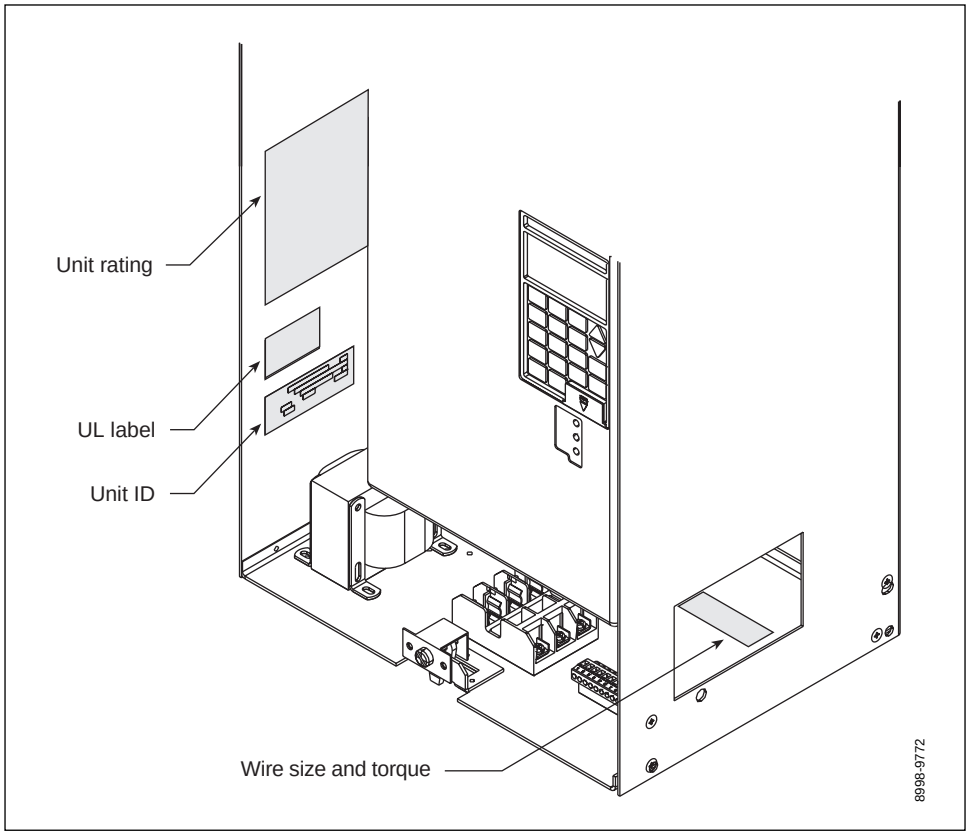

Figure 3: Label Locations Frame Sizes 1 to 3

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Unit Identification (cont.)

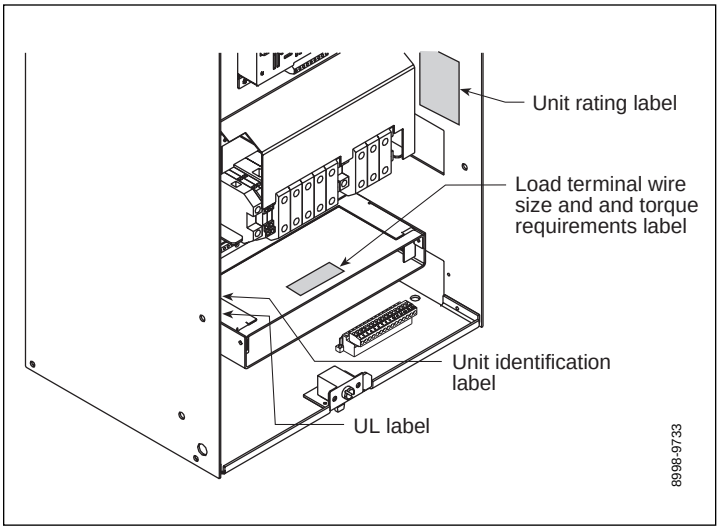

Figure 4: Label Locations Frame Size 4

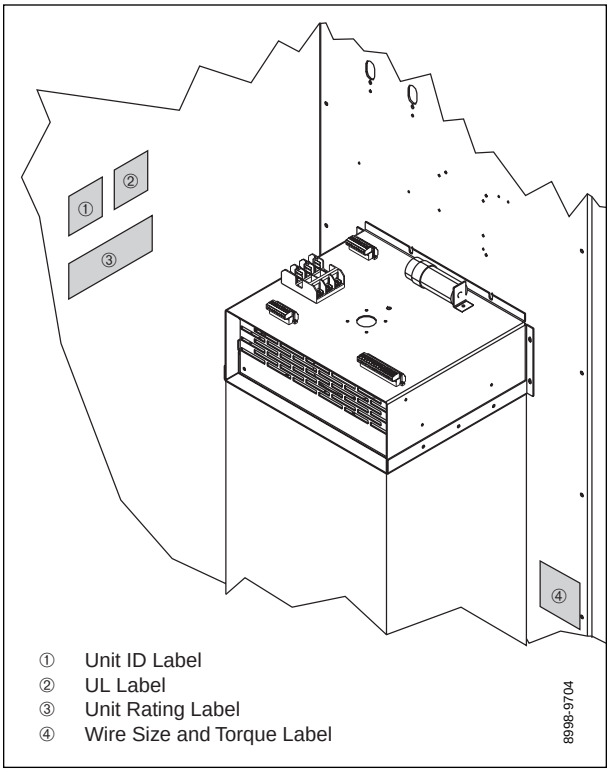

Figure 5: Label Locations Frame Size 5

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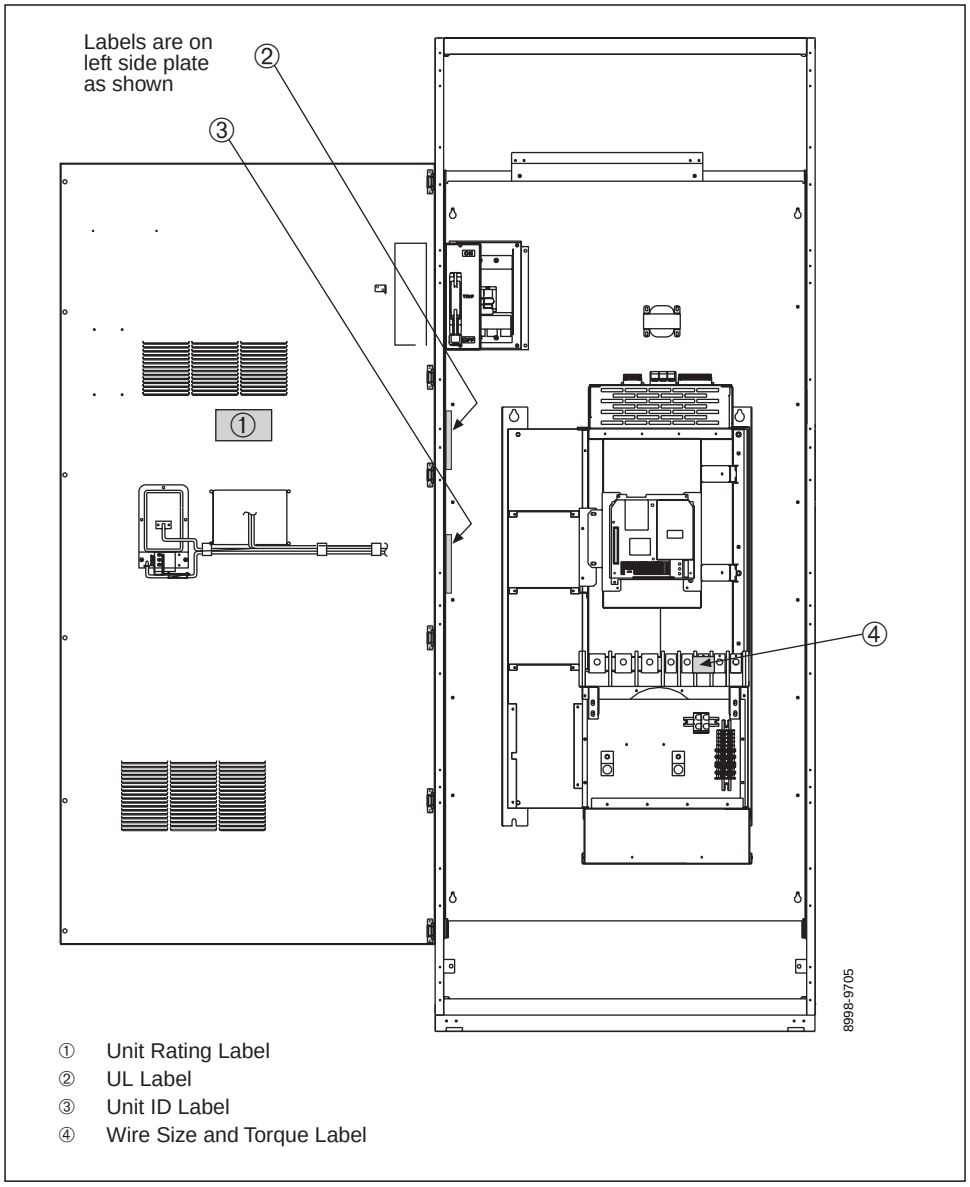

Figure 6: Label Locations Frame Size 6

Control and Load Wiring

On Frame Sizes 1–4, pull-apart type terminal blocks for field control wiring are mounted on the floor of the unit (Figure 7 on page 9).

On Frame Sizes 5 and 6, pull-apart terminals for field control wiring are mounted on top of the air discharge duct (Figure 8 on page 9).

Terminate field control wiring on the removable (top) portion of the terminal block. To separate or remove the top portion of the terminal block from the base, grasp the top half and pull up (Figure 9 on page 10). The terminal block is designated “FTB” on the unit wiring diagrams and in the figures in this manual.

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Each terminal on the field control terminal block (FTB) is rated for one #16-12 AWG wire or two #16 AWG wires. Torque terminal screws to 5 in-lbs (0.6 N•m).

NOTE: Depending on power and control options ordered, several analog or digital inputs and outputs are available at the control terminal blocks located on the ALTIVAR drive controller. Refer to the wiring diagram supplied with the MCC drive controller unit for I/O availability. Refer to the ALTIVAR drive controller configuration instruction manuals (listed on page 1) for I/O specifications and adjustments.

If a barriered bypass is supplied, additional pull-apart type terminal blocks are provided in the bypass starter (see Figures 10 and 11 on page 10 for typical locations in plug-on style bypass units). Some control schemes require connection to the terminal blocks in the bypass starter for field control wiring. In this instance, the wiring diagram designates the terminal block as “FTB” in the bypass starter location.

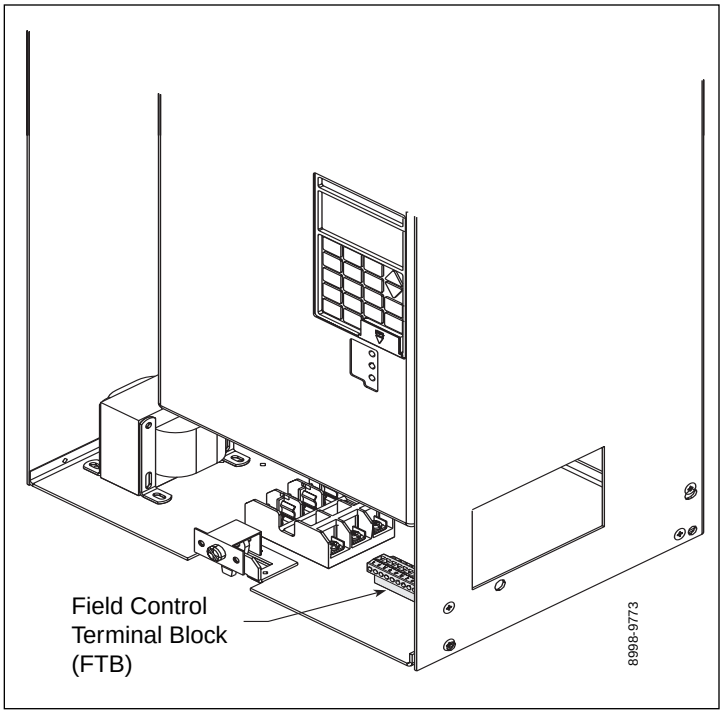

Figure 7: Field Terminal Block Sizes 1–4

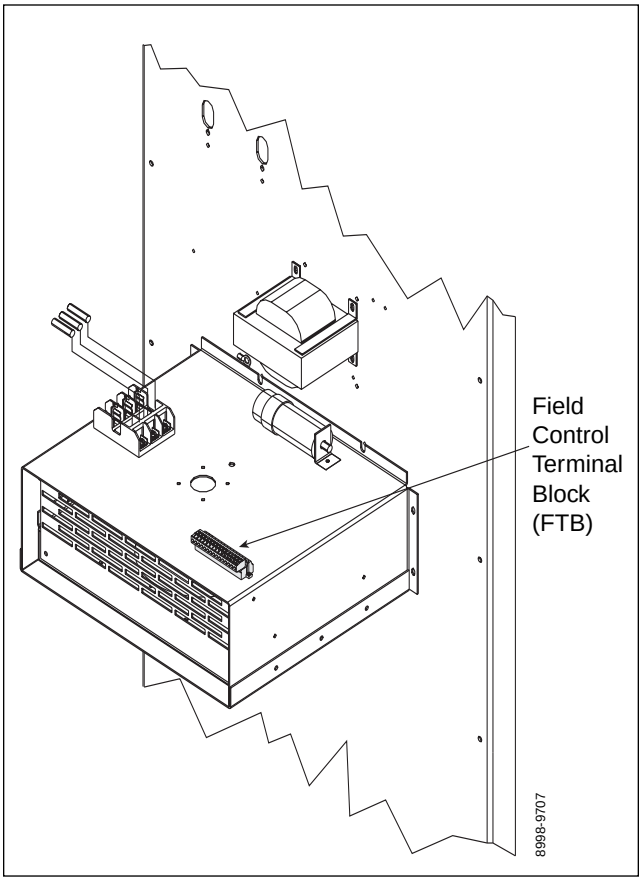

Figure 8: Field Terminal Block Sizes 5 and 6

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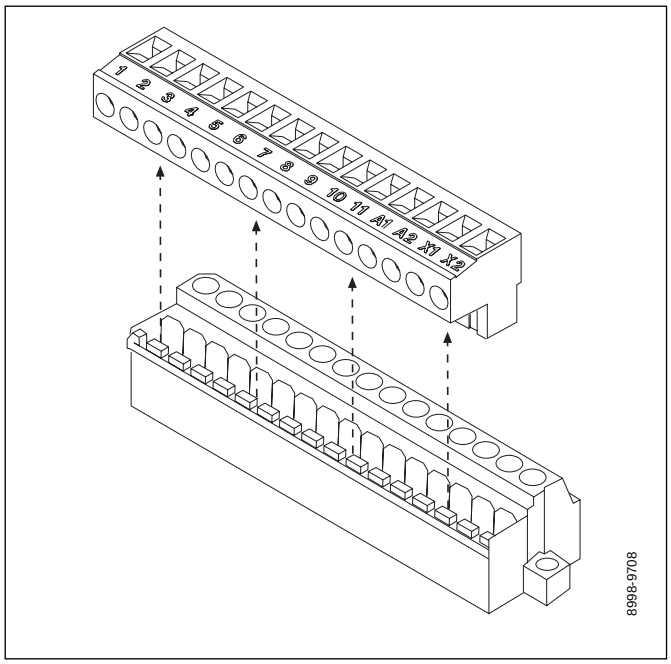

Figure 9: Pull Apart Type Field Control Terminal Block (FTB)

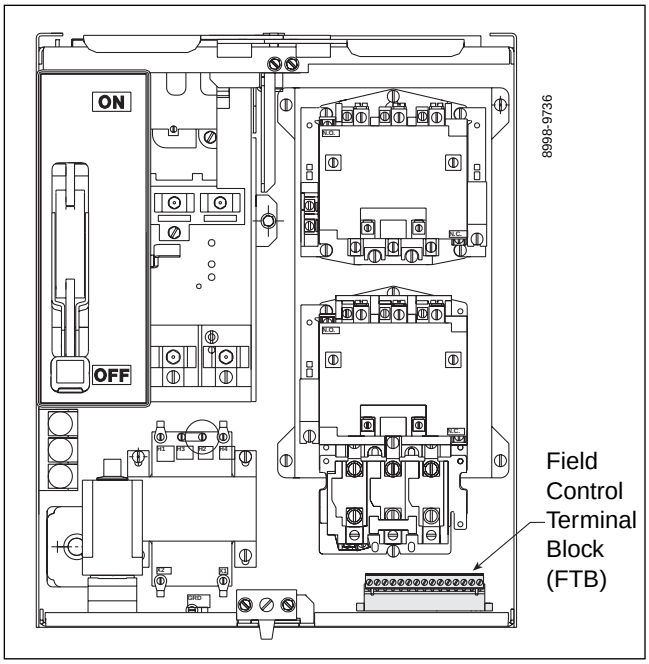

Figure 11: Typical Barriered Bypass

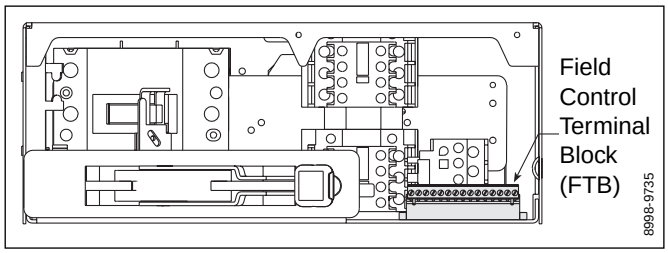

Figure 10: Application-Rated COMPAC 6™ Barriered Bypass

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Cable Connection Torque Values

Load terminal wire size and torque requirements are listed on the torque label located inside the MCC drive controller unit adjacent to the wiring terminals. See Figures 3 through 6 starting on page 6 for label locations.

Wire Routing and Interconnection

The controller Field Wiring Termination information in“APPENDIX A—SAMPLE ALTIVAR PARAMETER SHEET” on page 45, provides the required torque and maximum allowable wire size for each field wiring terminal. This information also provides requirements for the Wire Class, Noise Class, and Voltage Class of the field-connected conductors.

Wire Class

Wire Class describes the compatibility of the field wiring terminal with the conductor material and insulation system. When used with the required conductor current rating and controller-rated ambient temperature, the Wire Class forms the basis for the selection of a conductor size, which limits the temperature on the conductor insulation at the field wiring terminal to an acceptable range. Conductors with operating temperatures exceeding those specified by the Wire Class may be used, but the conductor size must be selected based on Wire Class limits.

Noise Class

Noise Class is a way of categorizing the electromagnetic properties of the voltages and currents present. Wiring is classified into the following six noise classes for selection of wiring methods and physical segregation purposes.

Quiet Wiring 1 (QW1)

High susceptibility analog and digital control signals. Signals in this class include digital communication and network circuits, controller analog input/output (I/O), and analog process signals.

Quiet Wiring 2 (QW2)

Medium susceptibility analog and digital control signals. Signals in this class include 24 Vdc and 24 Vac control circuits.

Standard Wiring 1 (SW1)

Low susceptibility control or power circuits rated less than 600 Vac (250 Vdc) and less than 15 A. Voltage and current spectra are generally contained within 0.05-9 kHz. Signals in this class include 120 Vac control circuits.

Standard Wiring 2 (SW2)

Power circuits rated greater than 15 A. Voltage and current spectra are generally contained within 0.05-9 kHz. Signals in this class include line power to controllers.

Standard Wiring 3 (SW3)

Reserved.

Pulse Wiring (PW1)

Control or power circuits with voltage or current spectra significantly exceeding 9 kHz. Signals in this class include motor and dynamic braking circuits fed from pulse-width modulated (PWM) power converters.

Voltage Class

The voltages present at the field wiring terminals are categorized by voltage class. Voltage is classified into conductor insulation categories (30 V, 150 V, 300 V, and 600 V) for the selection of conductor insulation, voltage rating, and for physical segregation purposes. Based on the noise and voltage class of the conductors, apply the wiring methods listed in Table 1 on page 12 to the drive system.

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Table 1: Wire Routing and Interconnection

Wiring Methods and Considerations	Noise Class of Conductors				
	QW1	QW2	SW1	SW2	PW1
Conductor Grouping in Wireways/Conduits					
1. All conductors of a 1- or 3-phase power circuit must be bundled to minimize stray magnetic fields.			X	X	X
2. All conductors of a DC power circuit must be bundled to minimize stray magnetic fields.			X	X	X
3. When paralleled conductors must be run in separate wireways or conduit, minimize stray magnetic fields by bundling the conductors into groups.				X	X
4. Maintain conductor runs short as practical.	X	X	X	X	X
Separation of Circuits					
1. DO NOT run different Noise Class conductors in the same conduit.	X	X	X	X	X
2. DO NOT run different Voltage Class conductors in the same conduit unless all conductors are insulated for maximum Voltage Class present.	X	X	X	X	X
3. Outside the enclosure, all PW conductor groups must be individually segregated using metallic conduit.					X
4. Segregate all conductors by Noise Class. Use the following circuit separation when conductors can run parallel for more than 12 inches:					
• Metallic conduit: 3 inches between QW to SW/PW	X	X	X	X	X
• Metallic tray: 3 inches between SW and PW			X	X	X
• Metallic tray: 6 inches between QW and SW/PW	X	X	X	X	X
• Against continuous metal surface: 3 inches between SW and PW			X	X	X
• Against continuous metal surface: 6 inches between QW and SW/PW	X	X	X	X	X
• Metallic conduit housing of QW: 12 inches to non-metallic conduit SW/PW	X	X	X	X	X
• Non-metallic conduit: 3 inches between SW and PW			X	X	X
• Non-metallic conduit: 24 inches between QW to SW/PW	X	X	X	X	X
5. If QW and SW wiring must cross SW2 or PW1 wiring, the bundles must cross at right angles.	X	X	X	X	X
Common Mode Noise Issues					
1. Provide adjacent signal returns using twisted pair cable.	X	X			
2. Galvanically isolate signal and associated signal return path when possible.	X	X			
Shielding					
1. Use metallic conduit for all power and control circuits external to the controller enclosure.	X	X	X	X	X
2. Shields should be continuous and equipped with a drain wire.	X	X	X		
3. DO NOT group different Noise Class conductors within the same shield.	X	X	X	X	X
4. Minimize the non-shielded portion of conductor at the ends of shielded cable.	X	X	X	X	X
5. When shielding AC or DC power conductors, group conductors to minimize magnetic field in shield.			X	X	X
Grounding					
1. Ground shields at one end only (controller end).	X	X	X	X	X
2. Use separate ground wire for each shield ground.	X	X	X	X	X
3. Provide a ground wire with all conductor groups whether in tray or conduit.			X	X	X
4. When multiple grounds must be made to a shielded power cable, the shield must have the same short circuit withstand capability as the ground conductor in the power cable.			X	X	X
5. Terminate all power grounds and shield grounds to the controller grounding point or bar.			X	X	X
6. Terminate all signal shield grounds to the terminals provided.	X	X			
7. Always supply a separate equipment grounding conductor with the controller power feed. DO NOT depend upon metallic conduit for ground connection.			X	X	X

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SECTION 5—OPERATION: STARTUP AND ADJUSTMENTS

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

- Read and understand ALTIVAR 66 Level 1 and 2 Configuration Instruction Manual (VD0C06S305_) or ALTIVAR 56 User's Manual (50006-519-01_) before using the keypad display.
- Lock the keypad after making adjustments.
- Do not reset drive parameters to configurations other than those specified on the parameter sheets supplied by Square D with the drive controller. Some factory-set drive parameters are critical for MCC drive controller unit control and power configurations.
- Do not alter programming of factory-installed control devices or power contactors.

Failure to observe these instructions can result in death, serious injury, or equipment damage.

NOTE: Before operating the drive controller, perform the procedures in "Factory Settings."

For complete information on MCC ALTIVAR drive controller unit operation, refer to ALTIVAR 66 Level 1 and 2 Configuration Instruction Manual (VD0C06S305_) or ALTIVAR 56 User's Manual (50006-519-01_) and any drawings supplied with the unit.

If an I/O extension module was provided, refer to ALTIVAR 66 I/O Extension Module and Level 3 Configuration Instruction Manual (VD0C06T306_) or ALTIVAR 56 User's Manual (50006-519-01_) for operation information.

Factory Settings

The ALTIVAR drive controller is software driven. The drive controller unit has been programmed to match the power and control options purchased with the MCC drive controller unit.

Do not change the factory-set parameters as indicated on the parameter sheet(s) supplied with the MCC drive controller unit. Several settings are critical to unit control and power configurations.

For information about these settings, refer to the ALTIVAR Parameter Sheets included with your shipment in the packet labeled "Installation/Maintenance Information." A sample parameter sheet is shown in Appendix A on page 45.

NOTE: For factory settings, refer only to the ALTIVAR parameter sheet(s) shipped with your package. These parameters supersede any parameter information shown in other ALTIVAR drive controller documentation.

The following key parameters should be checked and adjusted before motor operation:

- Nominal Current
- Motor Overload

The drive controller is equipped with a number of control algorithms and features for flexibility in application. Self-tuning is incorporated into several of the control algorithms to allow optimal control of the motor. If the drive controller has been configured as Normal Torque or High Torque control type, follow these precautions:

- The adjustment range of the Nominal Current parameter is 45% to 105% of the drive controller rated output current. This range allows the use of motors of equal horsepower size or one horsepower size less than the drive controller horsepower rating. To adjust the

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Nominal Current parameter, refer to the ALTIVAR 66 Level 1 and 2 Configuration Instruction Manual (VD0C06S305_) or ALTIVAR 56 User's Manual (50006-519-01_).

- Before powering up for the first time, compare the motor-nameplate current rating with the output current in:

  ALTIVAR 66: Table 1, Table 2, or Table 3 (depending on the drive controller torque type setting) in ALTIVAR 66 Receiving, Installation & Start-Up Instruction Manual (VD0C06S304_).

  ALTIVAR 56: Table 1 or 2 (depending on the drive controller torque type setting) in the ALTIVAR 56 User's Manual (50006-519-01_).

NOTE: If the motor rating is not within 45% to 105% of the value in the table, a different drive controller must be used.

⚠ WARNING

MOTOR OVERHEATING

Do not use on motors with a full load current rating that is not within the adjustment range of the drive controller Nominal Current parameter.

Failure to observe this instruction can result in injury or equipment damage.

- Each time an ALTIVAR 66 drive controller is powered up, direct current equal to the motor rated current is injected into the motor. This current allows the drive controller to determine the resistance of the motor and set the motor parameters.
- For optimal torque performance, the drive controller and motor should be operated under no load at 50/60 Hz during initial commissioning or any time the motor is changed. This operation allows the drive controller to measure key motor parameters.
- The Nominal Current parameter must be set on the drive controller keypad display to match the motor full load current rating. If the Nominal Current parameter cannot be adjusted to the motor full load current, Normal and High Torque control types cannot be used for the application.
- For applications using multiple motors, contact the factory.

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SECTION 6—MAINTENANCE

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn OFF all power supplying this equipment before working on or inside this equipment.
- Never operate the switch with the door open.
- Turn off the switch before removing or installing fuses or making load side connections.
- Always use a properly-rated voltage sensing device to confirm that all power is off.
- After disconnecting power, wait one minute before servicing a drive controller in order to allow the dc bus capacitors to discharge. After one minute, measure the dc bus capacitor voltage between the "+" and "-" terminals to verify that dc voltage is less than 45 Vdc. The dc bus LED is not an accurate indication of the absence of dc bus voltage. For additional information, refer to page 51 of the ALTIVAR 66 Receiving, Installation & Start-Up Manual (VDOC06S304_) or ALTIVAR 56 User's Manual (50006-519-01_).
- Do not short across dc bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to observe these instructions will result in death or serious injury.

Perform maintenance on the MCC drive controller unit a minimum of once per year, or more frequently if indicated by service conditions and your established maintenance policy. Details specific to maintenance of MCC ALTIVAR drive controller units are outlined in this manual.

Details specific to maintenance of MCCs are outlined in the Model 5 and Model 6 MCC instruction manuals. Before removing a drive from the MCC for maintenance, refer to the procedures listed under Unit Removal in the Maintenance section of the appropriate MCC instruction manual (Model 5 or Model 6).

All maintenance must be performed by qualified personnel.

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Power Fuse Recommendation And Location

Power fuse clips in MCC ALTIVAR drive controller units accommodate either 600 V Class CC fuses, 600 V Class T fuses, or 500 V Bussmann FWH Series fuses, depending on the unit rating. See Table 2 for the appropriate fuse type and mounting location.

NOTE: Every MCC ALTIVAR drive controller unit is shipped with power fuses factory installed.

Table 2: Power Fuse Recommendation and Location

Constant Torque or Variable Torque (low noise) HP at 460 V	Variable Torque HP at 460 V	Unit Frame Size	ALTIVAR Drive Catalog Number (Square D)②	Replacement Fuse Catalog Number (Bussmann)	UL Fuse Class	Fuse Ampere Rating	Fuse Location	Square D Part Number
1	1	1	ATV••U41N4U	KTK-R-5	CC	5	Figure 12	25430-10500
2	2	1	ATV••U41N4U	KTK-R-10	CC	10	Figure 12	25430-11000
3	3	1	ATV••U41N4U	KTK-R-15	CC	15	Figure 12	25430-11500
—	5	1	ATV••U54N4U	KTK-R-25	CC	25	Figure 12	25430-12500
5	—	1	ATV••U72N4U	KTK-R-25	CC	25	Figure 12	25430-12500
7.5	7.5	2	ATV••U90N4U	JJS-35	T	35	Figure 13	25417-20350
—	10	2	ATV••U90N4U	JJS-45	T	45	Figure 13	25417-20450
10	—	2	ATV••D12N4U	JJS-45	T	45	Figure 13	25417-20450
15	15	3	ATV••D16N4U	JJS-60	T	60	Figure 14	25499-00653
—	20	3	ATV••D16N4U	JJS-100	T	100	Figure 14	25499-00655
20	—	3	ATV••D23N4U	JJS-100	T	100	Figure 14	25499-00655
25	25	4	ATV••D33N4U	JJS-100	T	100	Figure 15	25499-00655
30	30	4	ATV••D33N4U	JJS-100	T	100	Figure 15	25499-00655
—	40	4	ATV••D33N4U	JJS-125	T	125	Figure 15	25417-21250
40	—	4	ATV••D46N4U	JJS-125	T	125	Figure 15	25417-21250
50	50	5	ATV••D54N4U	JJS-125	T	125	Figure 16	25417-21250
—	60	5	ATV••D54N4U	JJS-150	T	150	Figure 16	25417-21500
60	—	5	ATV••D64N4U	JJS-150	T	150	Figure 16	25417-21500
—	75	5	ATV••D64N4U	JJS-175	T	175	Figure 16	25417-21750
75	—	5	ATV••D79N4U	JJS-175	T	175	Figure 16	25417-21750
100①	100/125	6	ATV66C10N4U	FWH-400	—	400	Figure 17	25418-62401
125①	150	6	ATV66C13N4U	FWH-400	—	400	Figure 17	25418-62401
150①	200	6	ATV66C15N4U	FWH-500	—	500	Figure 17	25418-62501
200①	—	6	ATV66C19N4U	FWH-600	—	600	Figure 17	25418-62600

① Variable Torque Low Noise not available.

② " •• " in catalog numbers indicates ALTIVAR 56 or 66.

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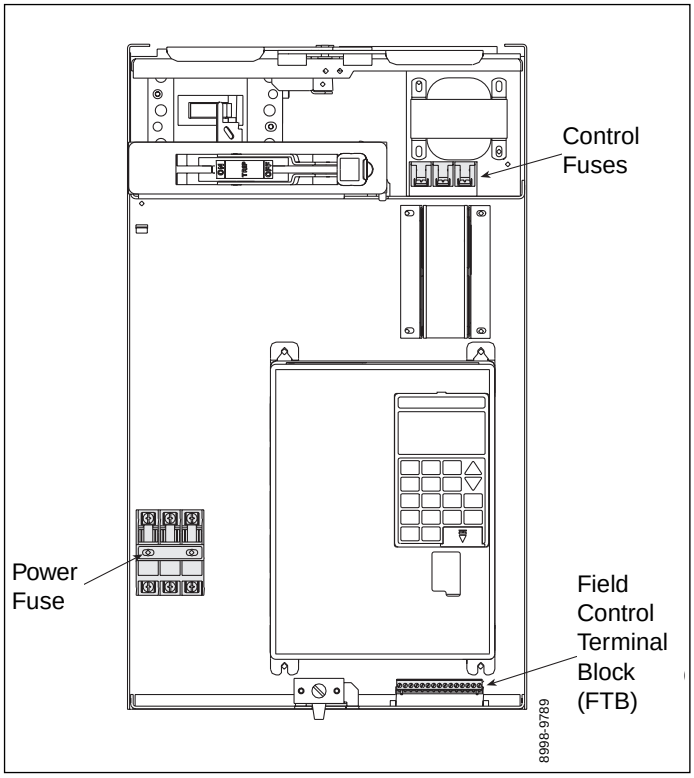

Figure 12: Fuse Location for Frame Size 1

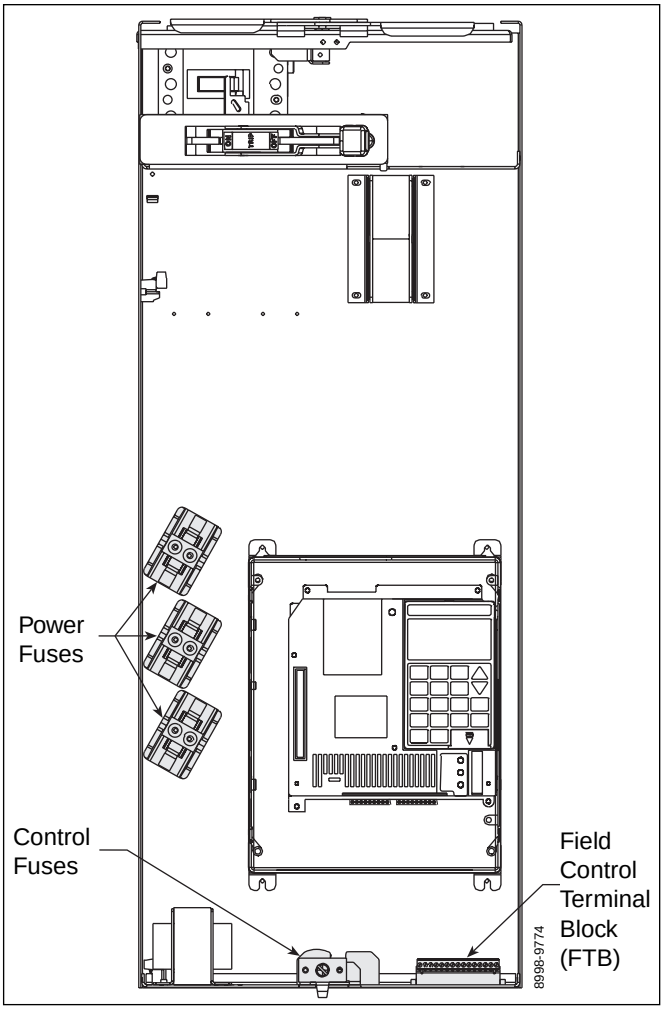

Figure 13: Fuse Location for Frame Size 2

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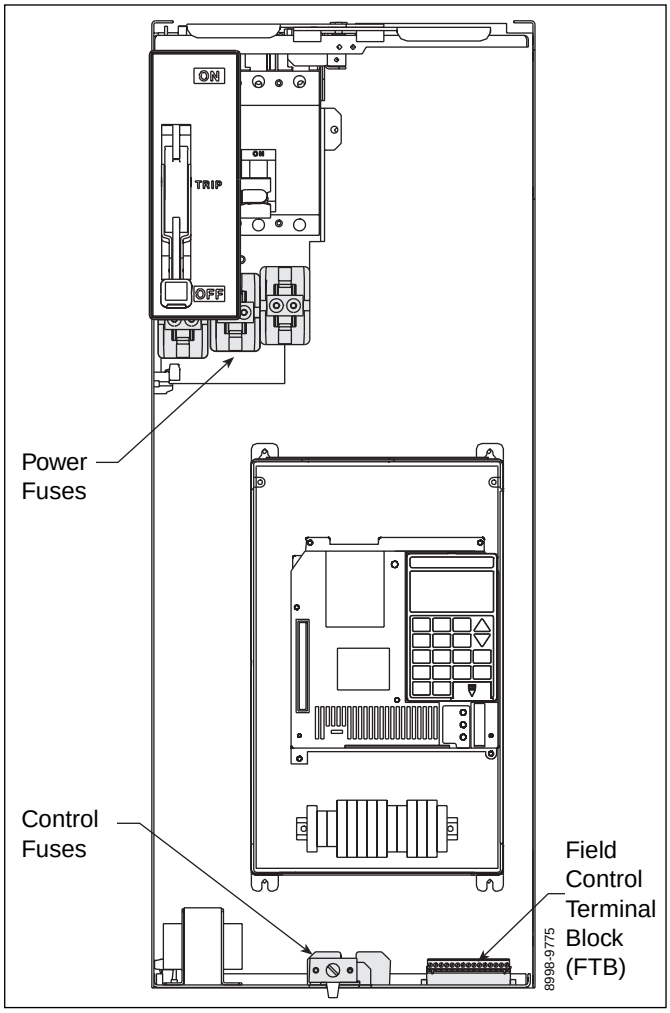

Figure 14: Fuse Location for Frame Size 3

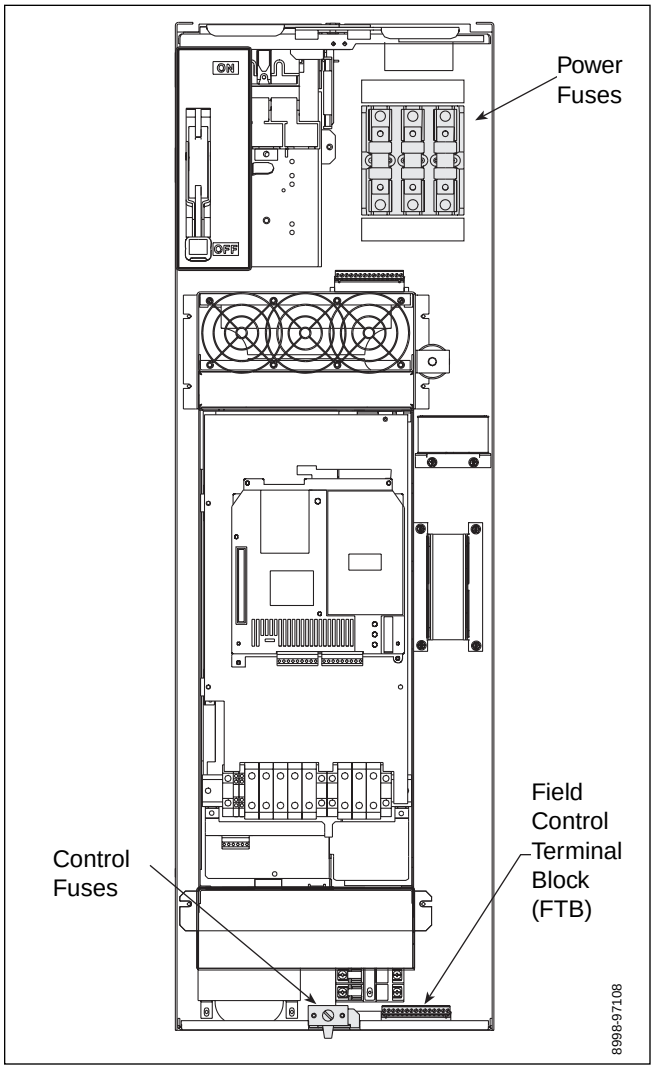

Figure 15: Fuse Location for Frame Size 4

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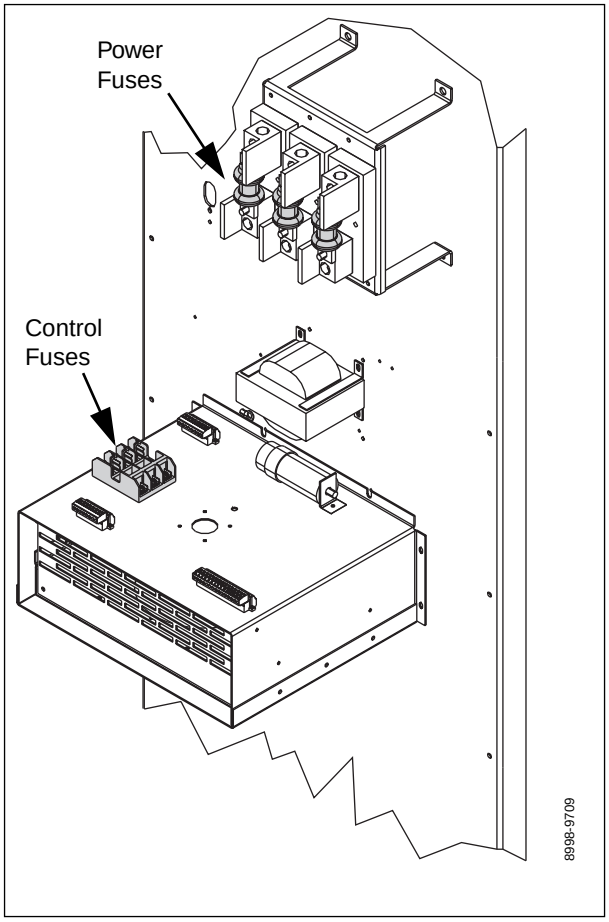

Figure 16: Fuse Location for Frame Size 5

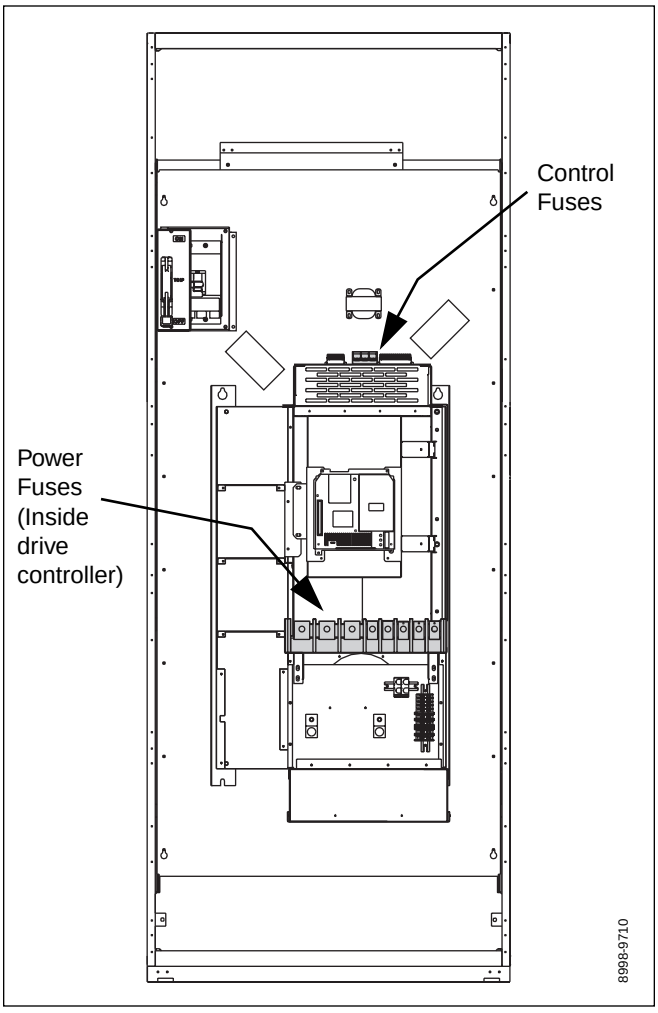

Figure 17: Fuse Location for Frame Size 6

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Plug-on Unit Removal

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn OFF all power supplying this equipment before working on or inside this equipment.
- Always use a properly-rated voltage sensing device to confirm that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to observe these instructions will result in death or serious injury.

To remove the plug-on unit:

1. Turn OFF all power supplying this equipment before working on or inside the equipment. Move the unit operating mechanism to the OFF position.
2. After disconnecting power, wait one minute to allow the dc bus capacitors to discharge.
3. Loosen the captive quarter-turn fasteners on the unit door (Figure 18 on page 21). Open the door. Using a properly rated voltage sensing device set to the 1000 Vdc scale, measure the dc bus capacitor voltage between the "+" and "-" terminals to confirm that the dc voltage is less than 45 Vdc. The dc bus LED is not an accurate indication of the absence of dc bus voltage. Do not short across the capacitor terminal with voltage present! If the bus capacitors are not fully discharged, do not operate the drive controller; contact your local Square D representative. Check for other live circuits using a properly rated voltage sensing device. De-energize all voltage sources. For additional information, refer to Procedure 1: Bus Voltage Measurement, in the ALTIVAR 66 Receiving, Installation & Start-Up Manual (VD0C06S304_) or ALTIVAR 56 User's Manual (50006-519-01_).
4. As necessary, disconnect the wiring from the drive controller load terminals (T1, T2, and T3) and the drive control terminals (J1, J12, and J13). Tag the terminations for reinstallation.
5. Remove the top portion of the pull-apart control field terminal blocks (FTB) to which the field wiring is connected (see Figure 9 on page 10).
6. Insulate the power cable ends that were connected to the terminals (T1, T2, and T3). Push the power leads and the top portion of the pull-apart control terminal blocks through the wiring port and into the vertical wire trough.
7. Remove the control station plate(s) from the rear of the unit door by loosening the four nut fasteners from the rear of each plate (see Figure 19 on page 22 and Figure 20 on page 23). Retain all hardware for remounting.

NOTE: On units with two control station plates, a label is provided on each plate indicating the position the plate must occupy (upper or lower). Each control station plate must be reinstalled in the position indicated by its label.

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8. Remove the keypad holder from the rear of the unit door by loosening the five nut fasteners from the rear of the keypad holder (see Figures 19 and 20).

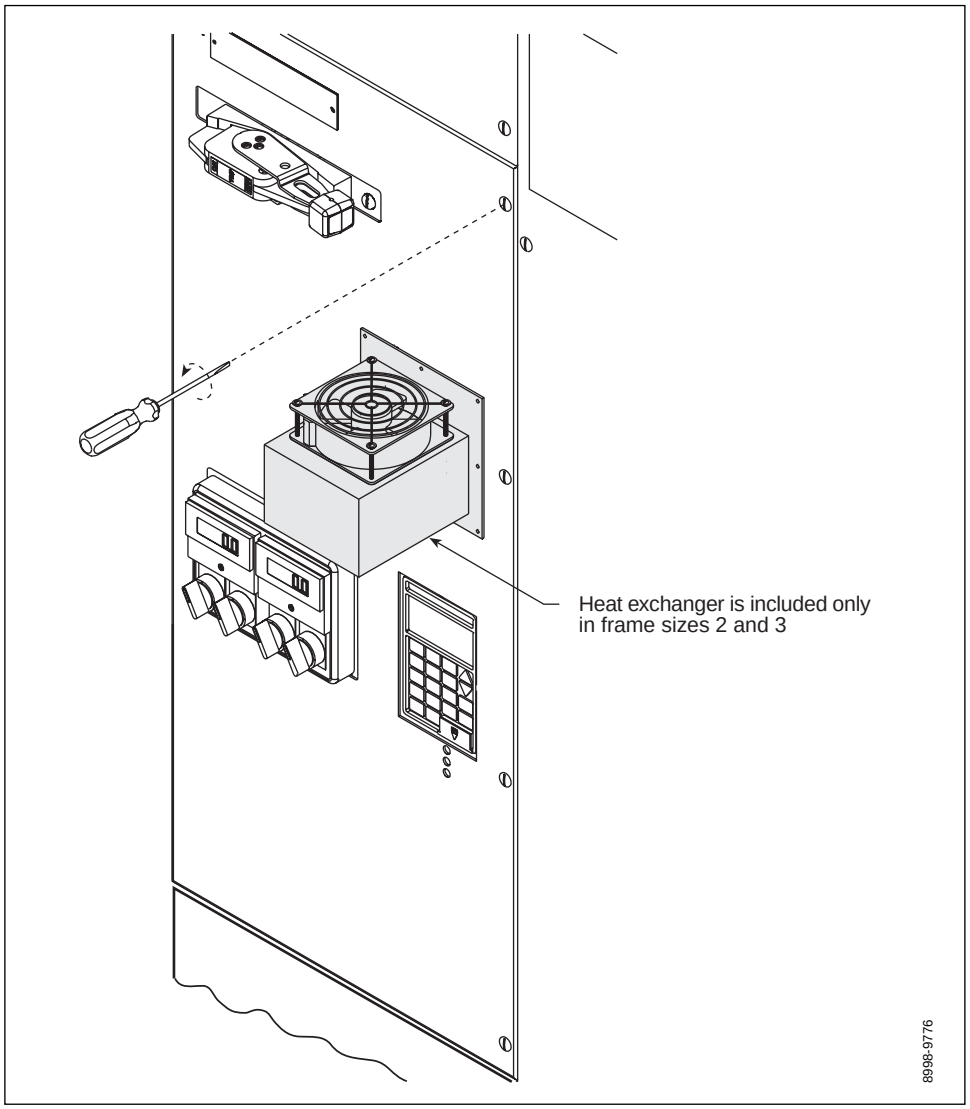

Figure 18: Loosening Captive Quarter-turn Fasteners

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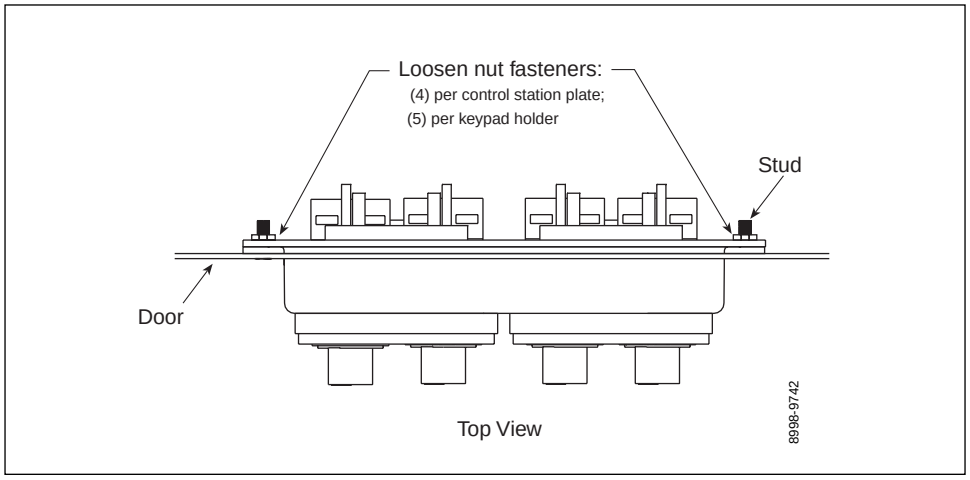

Figure 19: Close-up of Nut Fasteners

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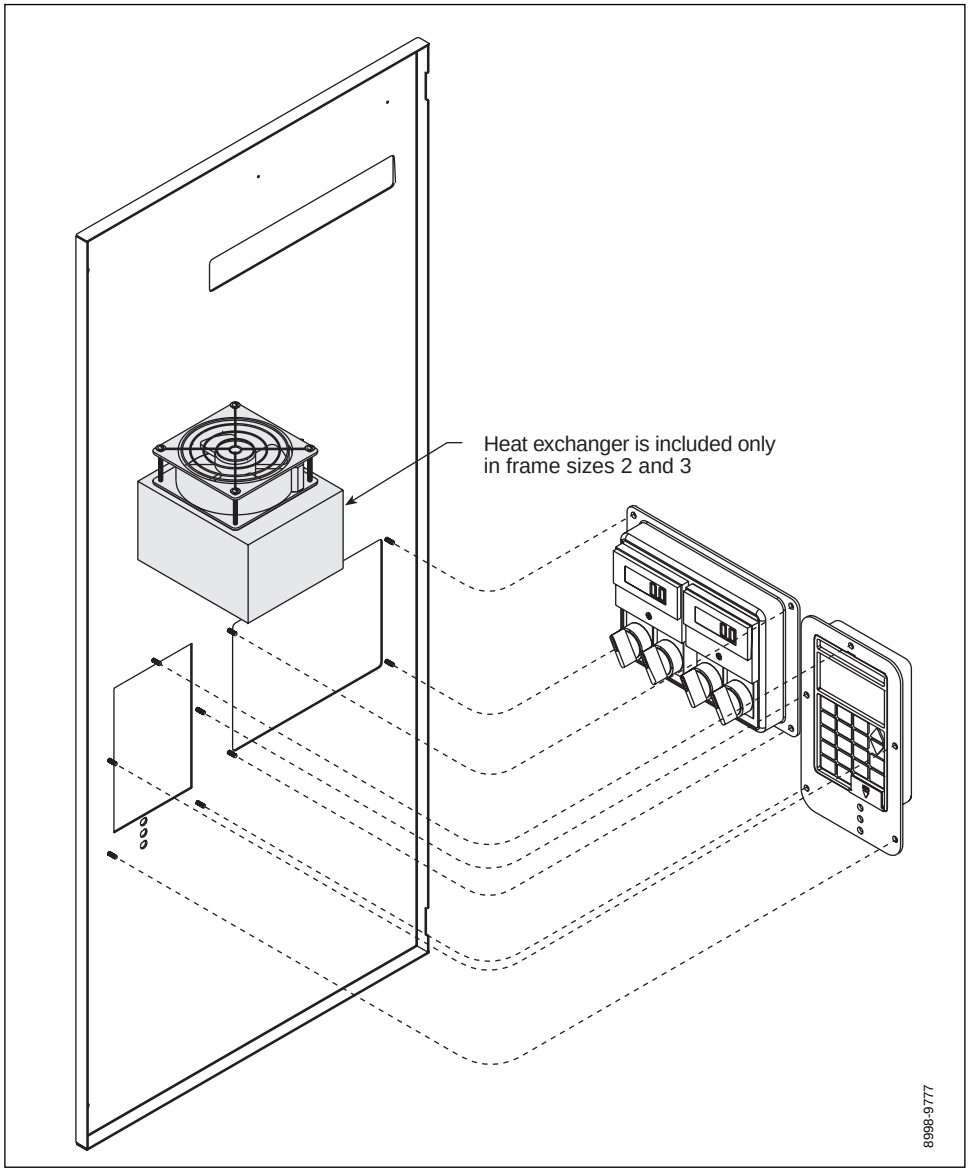

Figure 20: Removing Control Station Plate

9. *Frame Sizes 2 and 3 only*: Disconnect heat exchanger control power wiring by unplugging the top portion of the pull-apart terminal block within the unit adjacent to the door on the left side wall (see Figure 21 on page 24).

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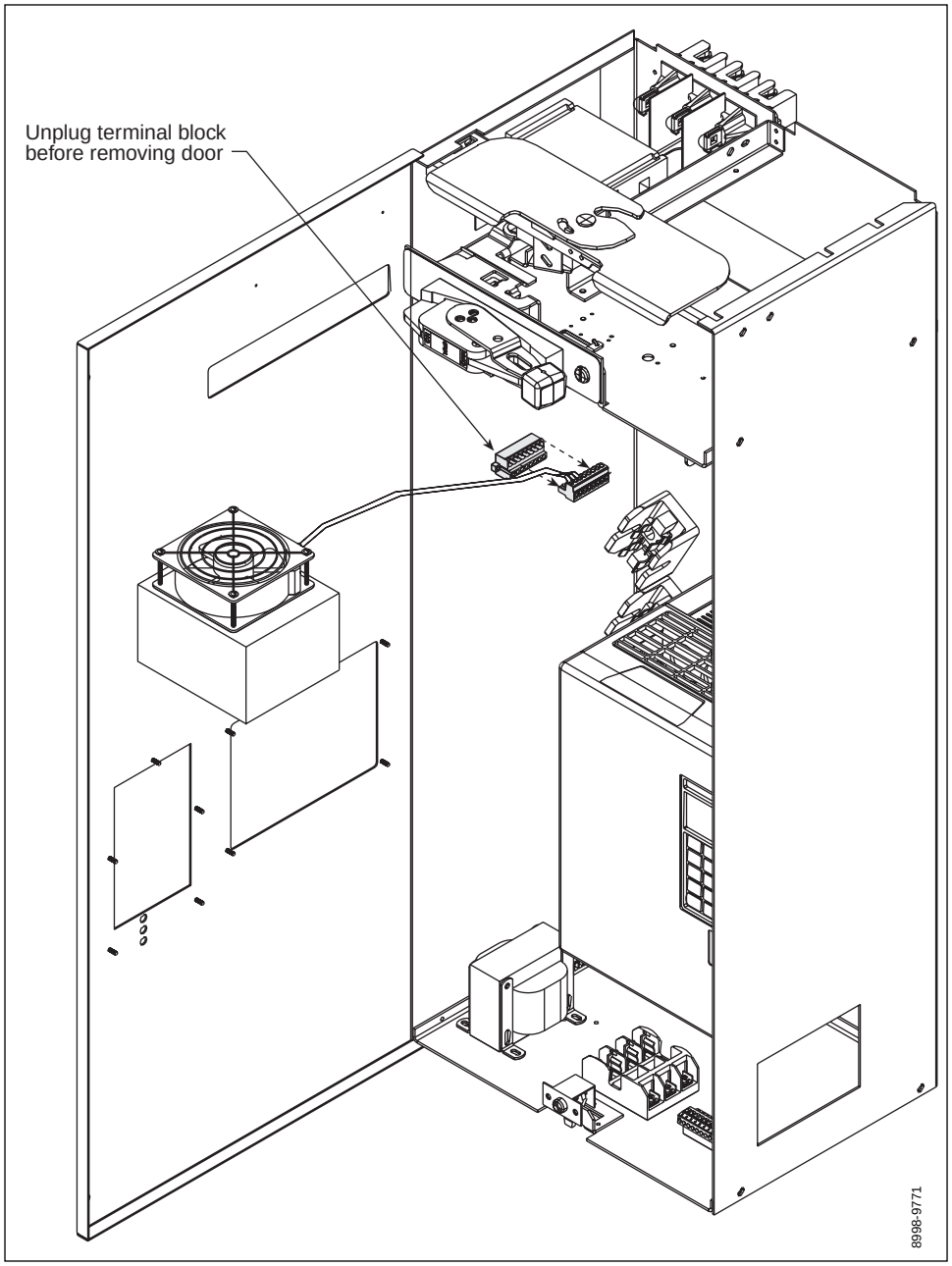

Figure 21: Disconnecting Heat Exchanger Wiring

10. If the unit has a lock-in device (at the bottom of the unit), release the device by turning its screw counter-clockwise until the locking pawl is parallel to the bottom of the unit (Figure 22 on page 25).

    If the unit has both a lock-in device and shoulder bolts (Figure 23 on page 25), release the lock-in device and remove the bolts. Retain all hardware for remounting.

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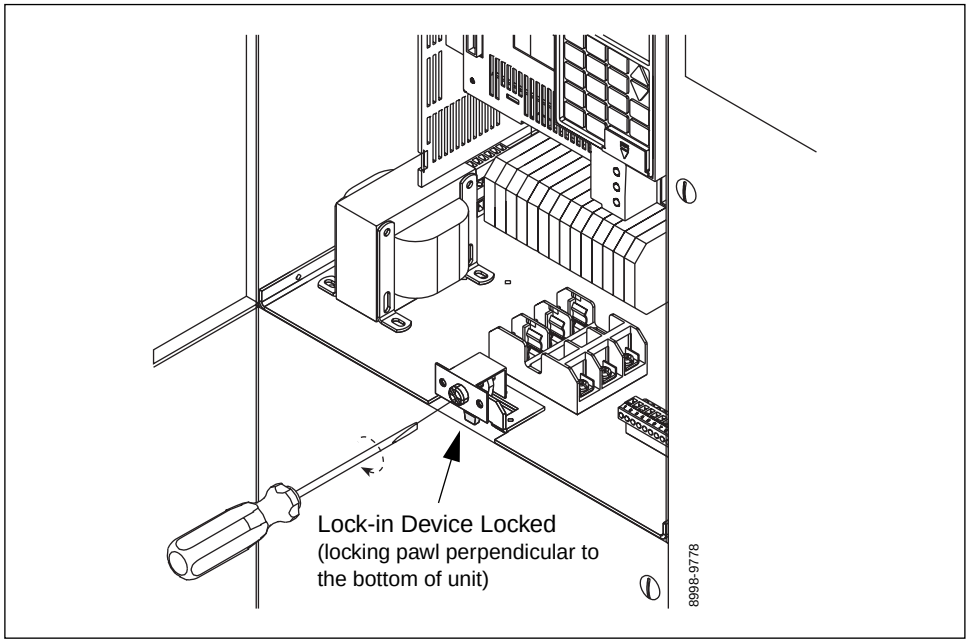

Figure 22: Releasing Lock-in Device

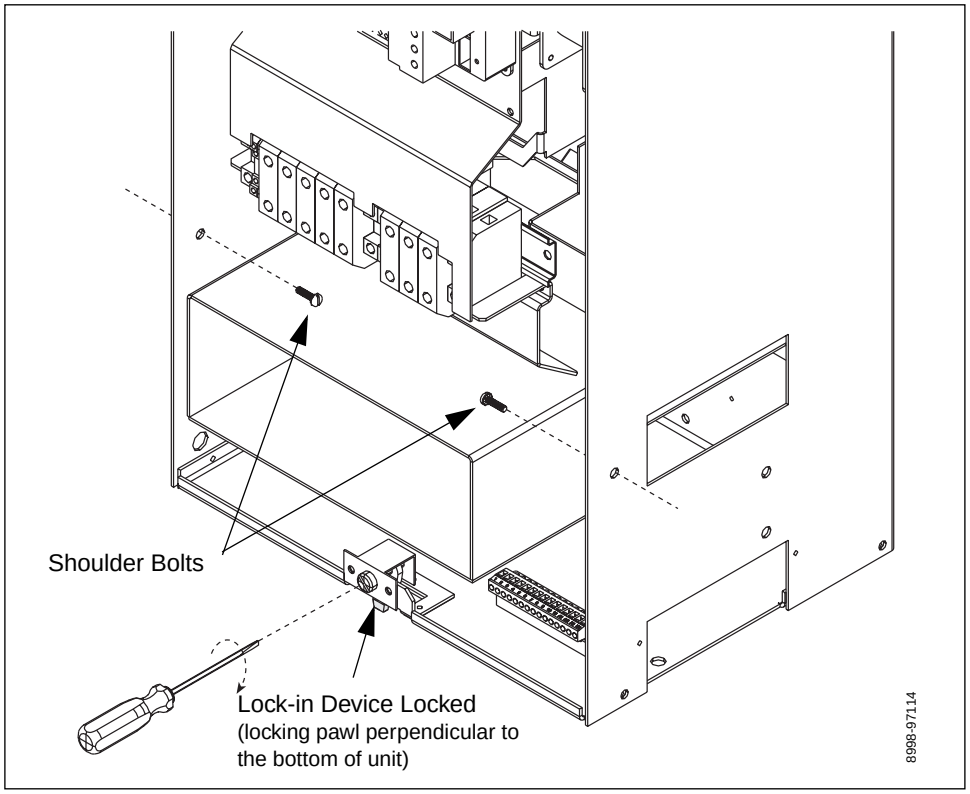

Figure 23: MCC Unit with Lock-in Device and Shoulder Bolts (Frame Size 4 Only)

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11. Rack the unit partially out of the MCC structure by pulling forward on the twin-handle cam mechanism at the top front of the unit (Figure 24 on page 26). Continue pulling forward until the handles are fully extended.

NOTE: The unit disconnect device must be in the OFF position. When the disconnect device is in the ON position, the operating-mechanism-to-structure interlock prevents the MCC drive controller unit from being withdrawn or inserted (see Figure 25 on page 27).

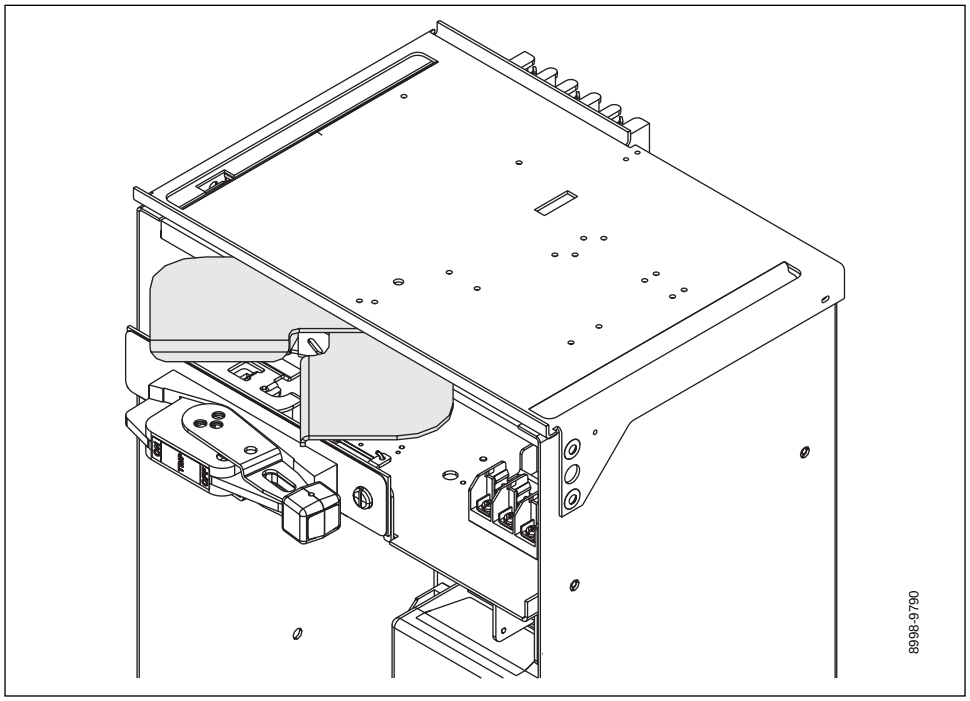

Figure 24: Twin-Handle CAM Mechanism

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12. If you choose to leave the partially withdrawn unit in the structure, a padlock can be used to prevent non-authorized personnel from re-installing (Figure 26).

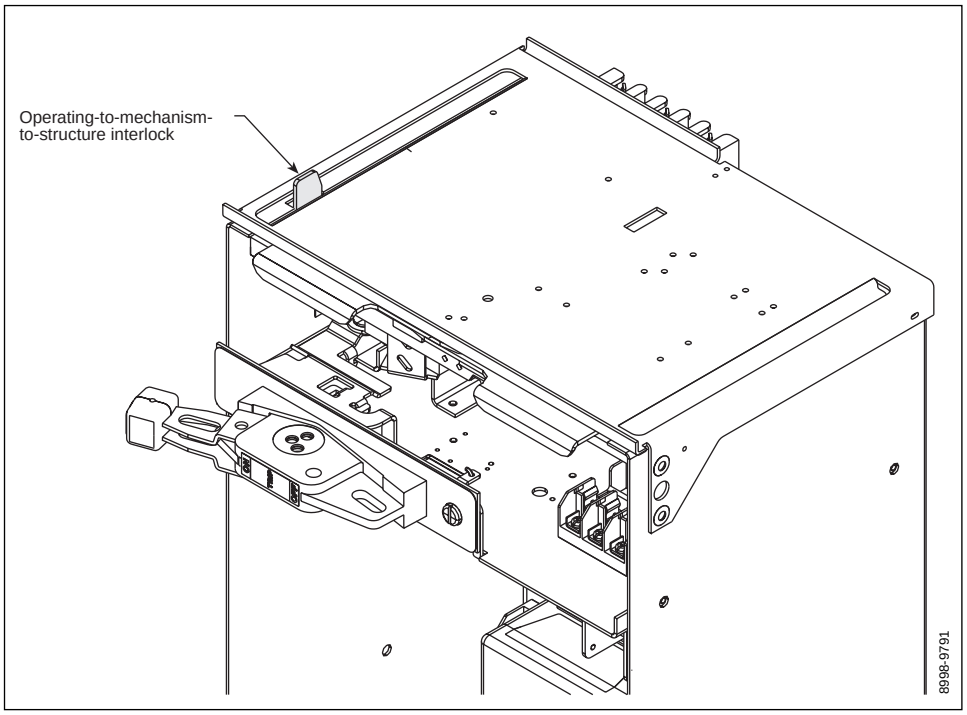

Figure 25: Operating-Mechanism-to-Structure Interlock

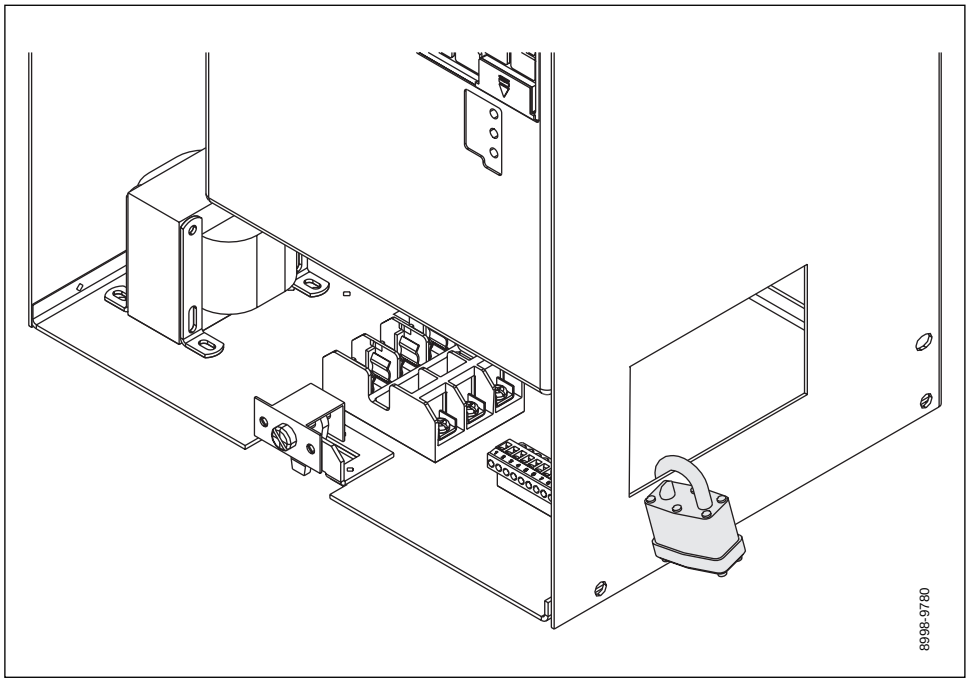

Figure 26: Padlocking Partially Withdrawn Unit

13. Remove the unit from the structure for servicing. To prevent damage to the stab assembly, place the unit flat on its bottom plate.

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NOTE: Lifting units larger than 24 inches (610 mm) high requires two or more persons using special handling precautions. If lifting devices are used on an MCC drive controller unit, refer to Figure 27, which illustrates proper lifting points. (Figure 28 illustrates a lifting point that is NOT recommended when lifting larger units.)

14. If necessary, the unit door can be removed from the structure. Refer to the procedures in the Control Unit Removal section of the appropriate MCC instruction manual (Model 5 or Model 6).

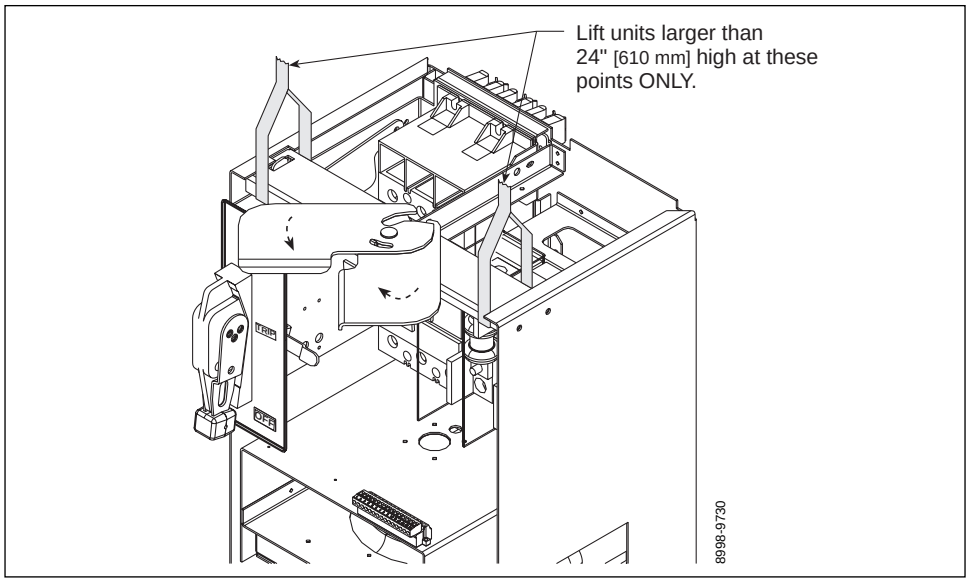

Figure 27: Proper Lifting Points For Units Larger Than 24 in (610 mm) high

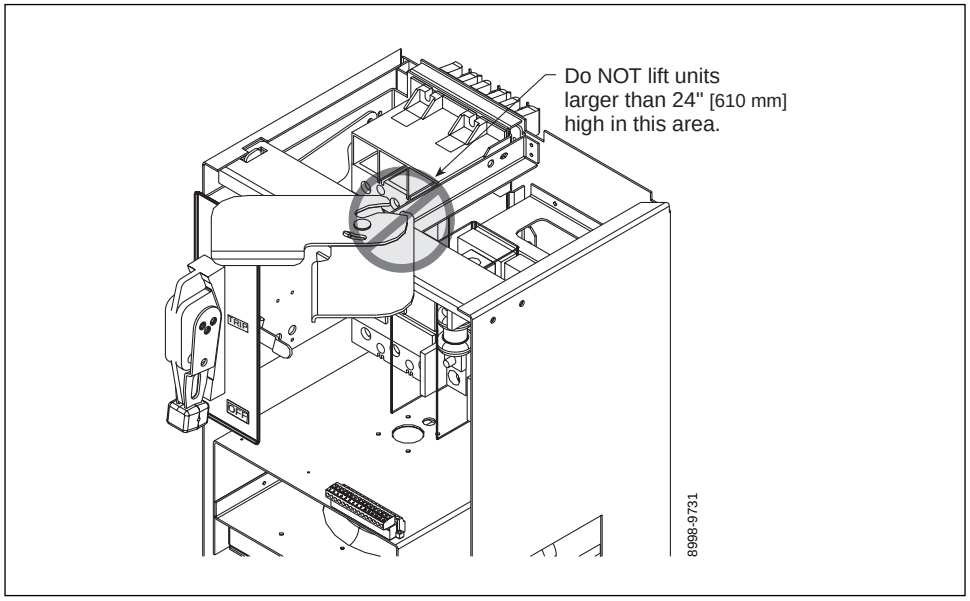

Figure 28: NOT a Recommended Lifting Point For Units Larger Than 24 in (610 mm) high

15. If the unit is being removed to repair or replace the drive component, it is recommended that you send the complete MCC unit back to the factory for service. The factory can quickly repair and fully test the unit. Contact your Square D or Schneider Canada

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representative to return an MCC unit to the factory. For details about servicing other components within the MCC drive controller unit, refer to the Maintenance section of the appropriate MCC instruction manual (Model 5 or Model 6).

NOTE: If it is determined that the stab assembly, circuit breaker, or fusible switch must be replaced, contact your Square D or Schneider Canada representative to obtain replacement parts.

For details about preventative maintenance for the ALTIVAR drive controller, refer to Chapter 4 of ALTIVAR 66 Receiving, Installation, and Start-Up Instruction Manual (VD0C06S304_) or ALTIVAR 56 User's Manual (50006-519-01).

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Plug-on Unit Reinstallation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn OFF all power supplying this equipment before working on or inside this equipment.
- Always use a properly-rated voltage sensing device to confirm that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to observe these instructions will result in death or serious injury.

When maintenance is complete, reinstall all units. For MCC drive controller unit installation, follow these steps:

1. Reinstall the door if it was removed.
2. Temporarily secure the keypad, control station plate, and associated wiring inside the unit.

   NOTE: Lifting units larger than 24 in (610 mm) high requires two or more persons using special handling precautions. If lifting devices are used on an MCC drive controller unit, refer to Figure 27 on page 28, which illustrates proper lifting points. Figure 28 on page 28 illustrates a lifting point that is NOT recommended when lifting larger units.

3. Lift the unit and rest on the bottom shelf of the space in which the unit will be installed.
4. Align top shelf guides and unit guides. Slide the unit into the structure. Keep the sides even when sliding the unit into the structure to prevent binding.
5. When the unit is partially inside the structure, pull the twin-handle cam mechanism forward to open the slot between them (see Figure 24 on page 26).
6. Slide the unit into the structure until the twin-handle cam mechanism makes contact with the ratching pin in the shelf above the unit. Push both handles of the twin-handle cam mechanism until they are flush with the structure.
7. If the unit has a lock-in device (at the bottom of the unit) secure the device by turning its screw clockwise until the locking pawl pulls the unit bottom shelf flush with the structure (see Figure 22 on page 25).
8. Reinstall the keypad and control station plate onto the doors with the hardware saved during removal.

   NOTE: On units with two control station plates, a label is provided on each plate indicating the position the plate must occupy (upper or lower). Each control station plate must be re-installed in the position indicated by its label.

9. Route the wires into the clip fasteners located on the inside of the door. Follow the wire routing instructions that are also located on the inside of the door.
10. **Frame Sizes 2 and 3 only:** reconnect the heat exchanger control power wiring by grasping the removable portion of the pull-apart terminal block and pushing down into the base of the terminal block mounted on the unit left side wall adjacent to the door (see Figure 21 on page 24).
11. Reinstall the field control and power wiring.
12. Close and secure the door with the quarter-turn fasteners.
13. Installation is complete. Return the MCC to service.

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Cooling System Maintenance

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn OFF all power supplying this equipment before working on or inside this equipment.
- Always use a properly-rated voltage sensing device to confirm that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to observe these instructions will result in death or serious injury.

- Heat exchangers (if any) and door vents (if any) require periodic cleaning.
- Cooling system air movers (fans and impellers) do not require any scheduled maintenance. Fan/impeller or heat exchanger removal is necessary only when replacement is indicated by troubleshooting (see “Troubleshooting: Drive Is Overheating” on page 38).

Heat Exchanger Operation

Frame Size 2 and 3 units have an air-to-air heat exchanger mounted on the door of the unit to remove heat from the unit. The heat exchanger prevents mixing of clean internal unit air with contaminated external air. Protection of the internal electronics from external contaminants is necessary to maintain the NEMA Type 12 oil tight and dust tight rating.

A heat exchanger consists of two fans blowing across a heat pipe radiator. The interior fan of the heat exchanger draws air heated by the electronics over the inside half of the heat pipe radiator. The heat pipe absorbs the heat from the air and transfers the heat to the outside half of the heat pipe radiator. The exterior fan of the heat exchanger circulates cooler outside air across the heat pipe radiator and removes the heat from the heat pipe. The interior fan blows the cooled air toward the electronic components to cool them. The heat exchanger removes heat from the inside of the unit while maintaining the inside electronics sealed from outside contaminants.

⚠ WARNING

SHARP CORNERS

Avoid contact with the edges of the MCC heat exchanger unit.

Failure to observe this instruction can result in head injury or laceration.

⚠ CAUTION

HEAT EXCHANGER DAMAGE

- Do not allow objects to drop into and interfere with the rotation of the heat exchanger fan.
- Do not mount or place objects above or below the heat exchanger that may block or interfere with air flow.

Failure to observe these instructions can result in equipment damage.

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Heat Exchanger Maintenance

The heat exchanger, included only on Frame Sizes 2 and 3, is designed for high reliability with a mean time between failure of 83,000 hours. To ensure proper cooling of the MCC drive controller unit, clean the heat exchanger fans and fins a minimum of once per year or more frequently if indicated by service conditions and your established maintenance schedule. To clean the heat exchanger:

1. Inspect all fins on the heat exchanger for straightness and alignment. If any fins are bent see Fin Repair below for necessary steps to re-align the fins.
2. Vacuum all fins and fan assemblies both on the inside and outside portion of the heat exchanger.

NOTE: Do not use compressed air; it will redistribute contaminants to other surfaces. Be careful not to damage the fins on the heat exchanger. The fins must be kept straight to ensure proper cooling of the MCC drive controller unit.

Fin Repair

If the fins become damaged during maintenance or through accidental contact, they must be straightened immediately. A flat bladed screw driver can be used to bring an individual fin into straight alignment. To make this process easier, a fin straightening tool (part no. 1727 K13) is available from McMaster-Carr, a major distributor of industrial supplies. The fin straightening tool should be used to align several fins by combing them simultaneously with the teeth of the tool.

Heat Exchanger Removal

To remove the heat exchanger from Frame Size 2 or 3 units, follow these steps:

1. Disconnect all power supplying the equipment.
2. Disconnect the heat exchanger control power wiring by removing the top portion of the pull-apart control terminal block mounted on the left side of the unit adjacent to the door.
3. Remove the four heat exchanger mounting screws located on the front flange around the heat exchanger. Retain all hardware for remounting.
4. Remove the heat exchanger through the front of the unit door. Carefully feed the heat exchanger wires through the unit door heat exchanger opening.

Heat Exchanger Installation

To install a heat exchanger on Frame Size 2 and 3 units, follow these instructions:

1. Disconnect all power supplying the equipment.
2. Carefully feed the heat exchanger wires through the heat exchanger door opening.
3. Install the heat exchanger through the front of the unit door.
4. Install the four heat exchanger mounting screws on the front of the heat exchanger mounting flange.
5. Re-connect the heat exchanger control wires by pushing the top portion of the pull-apart terminal block to which the control wires are connected into the base of the pull-apart terminal block mounted on the left side wall of the unit adjacent to the door.

Motorized Impeller Removal

Frame Size 4 ,5, and 6 units have a cooling system that uses a motorized impeller. A motorized impeller is an air mover that either draws in or exhausts air, and changes the direction of the air flow at right angles. Frame Size 6 unit cooling systems are described in the ALTIVAR drive component Receiving, Installation, and Start-Up Instruction Manual.

To remove the motorized impeller from Frame Size 4 or 5 units:

1. Disconnect all power supplying the equipment.
2. Remove the motorized impeller wiring from the control wiring terminal block (Figure 29 on page 33).
3. Remove the two screws located in the front of the protective grill and the two screws located on the side of the duct housing (Figure 30 on page 34).
4. Remove the protective grill (Figure 30).
5. Remove the four impeller mounting screws located on top of the duct housing (Figure 30).

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6. Remove the motorized impeller through the front of the duct housing. Carefully feed the impeller motor wires through the hole in the top of the duct housing (Figure 31).

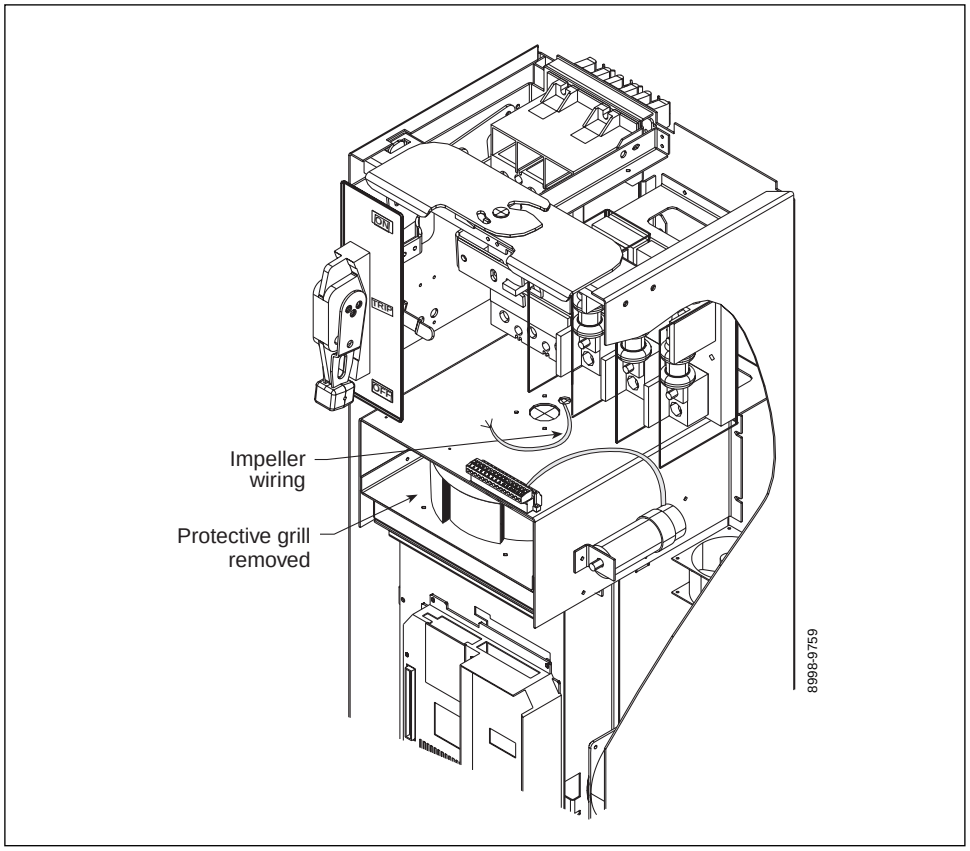

Figure 29: Impeller Wiring Removal

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Motorized Impeller Removal (cont.)

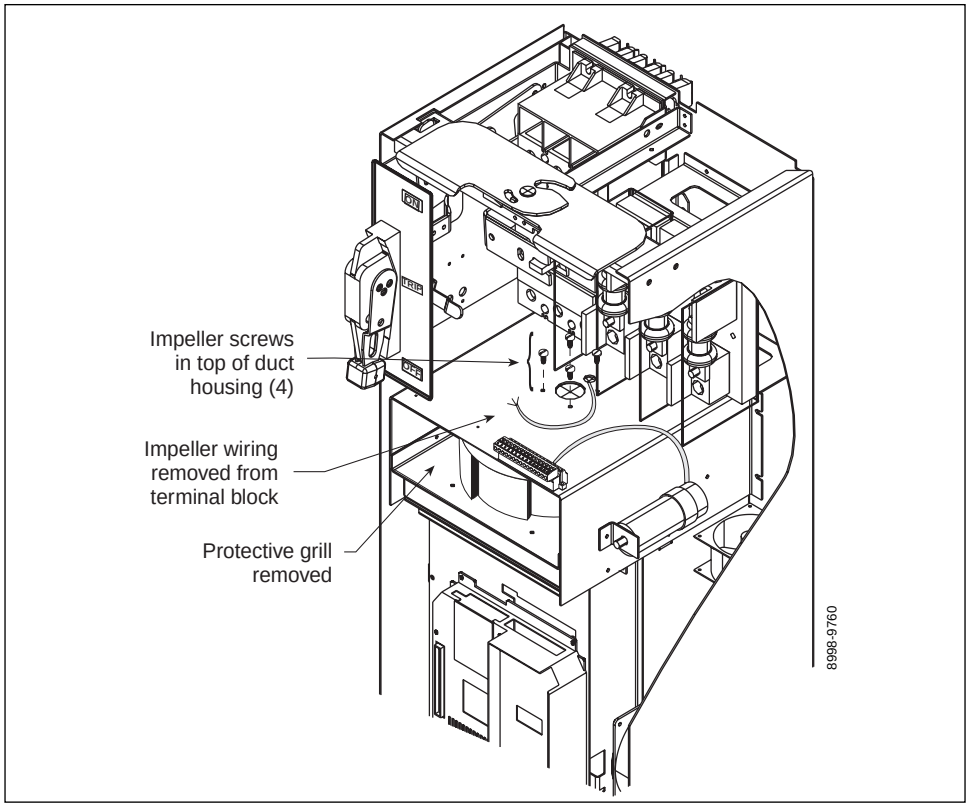
Impeller screws in top of duct housing (4)
Impeller wiring removed from terminal block
Protective grill removed
8998-9760

Figure 30: Protective Grill and Impeller Screw Removal

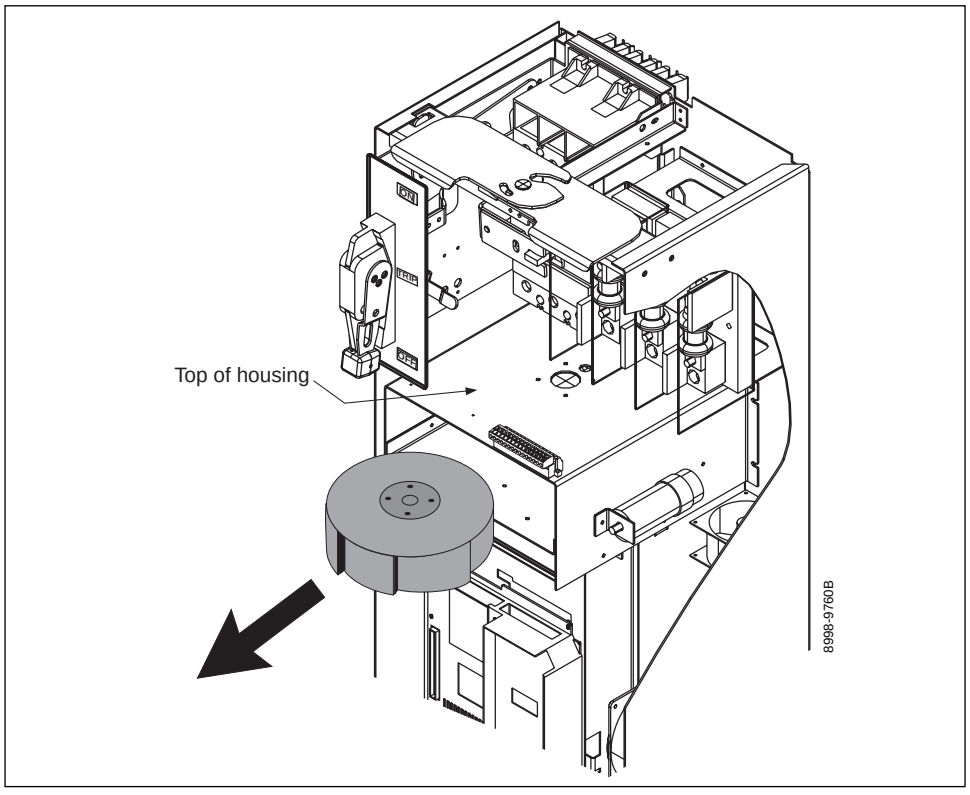

Figure 31: Motorized Impeller Removal

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Motorized Impeller Installation

To install the impeller on Frame Size 4 and 5 units:

1. Disconnect all power supplying the equipment.
2. Install the motorized impeller through the front of the duct housing. Carefully feed the impeller motor wires through the hole in the top of the duct housing (Figure 29 on page 33).
3. Install the four impeller mounting screws on top of the duct housing (Figure 30 on page 34).
4. Replace the protective grill (Figure 30).
5. Replace the two screws in the front of the protective grill and the two screws on the side of the duct housing (Figure 30).
6. Insert the motorized impeller wiring into the control wiring terminal block (Figure 31 on page 34). Wires are color coded for proper placement.

Duct System Cleaning For Frame Sizes 4, 5, and 6

To ensure proper ventilation of the MCC drive controller unit, clean the duct system a minimum of once per year or more frequently if indicated by service conditions and your established maintenance schedule. To clean the duct system:

1. Remove the top duct cover by following the appropriate impeller removal procedures on page 32.
2. Vacuum all of the top and bottom duct areas. Do not use compressed air; it will redistribute contaminants to other surfaces.
3. Replace the top duct cover when complete.
4. Vacuum all vented openings in the MCC drive controller unit door. Do not use compressed air; it will redistribute contaminants to other surfaces.

Filter Kit (Optional)

A filter kit is available for Frame Sizes 4, 5, and 6 to cover the bottom inlet duct of the cooling system.

The filter will allow some contaminants to be captured in a foam filter element rated at 30 pores per inch. This filter is offered as a factory or field installed option for users who want to reduce the amount of contaminants pulled through the cooling ducts of the MCC drive controller unit. Filters are not required to maintain the UL Listing of the unit for NEMA Type 12 dust tight or drip tight integrity. The following filter kits are available from Square D for ALTIVAR MCC drive controller units:

- Frame Size 4 - 80442-775-50
- Frame Size 5 - 80442-775-51
- Frame Size 6 - 80442-775-52

Additional foam filter elements can be ordered to replace the filter element provided with the kit. Each filter element is pre-cut to fit with a particular drive frame size inlet duct. The following filter elements are available from Square D:

- Frame Size 4 - 80442-638-03
- Frame Size 5 - 80442-638-02
- Frame Size 6 - 80442-638-01

Filter Kit Maintenance

NOTE: Maintenance procedures for the MCC drive controller units should be revised to inspect and clean the filter element every 6 months or more frequently if indicated by service conditions and your established maintenance schedule.

1. Clean duct filters by removing the filter element from the front door bracket over the bottom duct.
2. Vacuum or wash the filter element thoroughly.
3. Dry the element and reinstall.

Replace the filter element when it becomes damaged or begins to deteriorate in performance.

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Insulation Test

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

Disconnect all solid-state devices, capacitor units, and any other devices not designed to withstand megger voltages.

Failure to observe this instruction can result in injury or equipment damage.

Refer to the appropriate MCC instruction manual (Model 5 or Model 6) for MCC insulation test procedures.

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Troubleshooting

Flow charts on the following two pages demonstrate necessary steps to take if the drive is malfunctioning. If the drive is overheating, refer to the troubleshooting flow chart on page 38. If the drive will not run, refer to the troubleshooting flow chart on page 39.

NOTE: Read and understand the hazard statement on this page before proceeding to the troubleshooting flow charts on pages 38 and 39.

Refer to Instruction Bulletin VDOC06S304_, Table 22 or 23 or Instruction Bulletin 50006-519-01_, Figure 27 or Table 19 for protective trips not listed here.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn OFF all power supplying this equipment before working on or inside this equipment.
- Never operate the switch with the door open.
- Turn off the switch before removing or installing fuses or making load side connections.
- Always use a properly-rated voltage sensing device to confirm that all power is off.
- Always use a properly-rated voltage sensing device at all line and load side fuse clips to confirm that the switch is OFF.
- After disconnecting power, wait one minute before servicing a drive controller in order to allow the dc bus capacitors to discharge. After one minute, measure the dc bus capacitor voltage between the “+” and “-” terminals to verify that dc voltage is less than 45 Vdc. The dc bus LED is not an accurate indication of the absence of dc bus voltage. For additional information, refer to page 51 of the ALTIVAR 66 Receiving, Installation & Start-Up Manual (VDOC06S304_) or ALTIVAR 56 User’s Manual (50006-519-01_).
- Do not short across dc bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to observe these instructions will result in death or serious injury.

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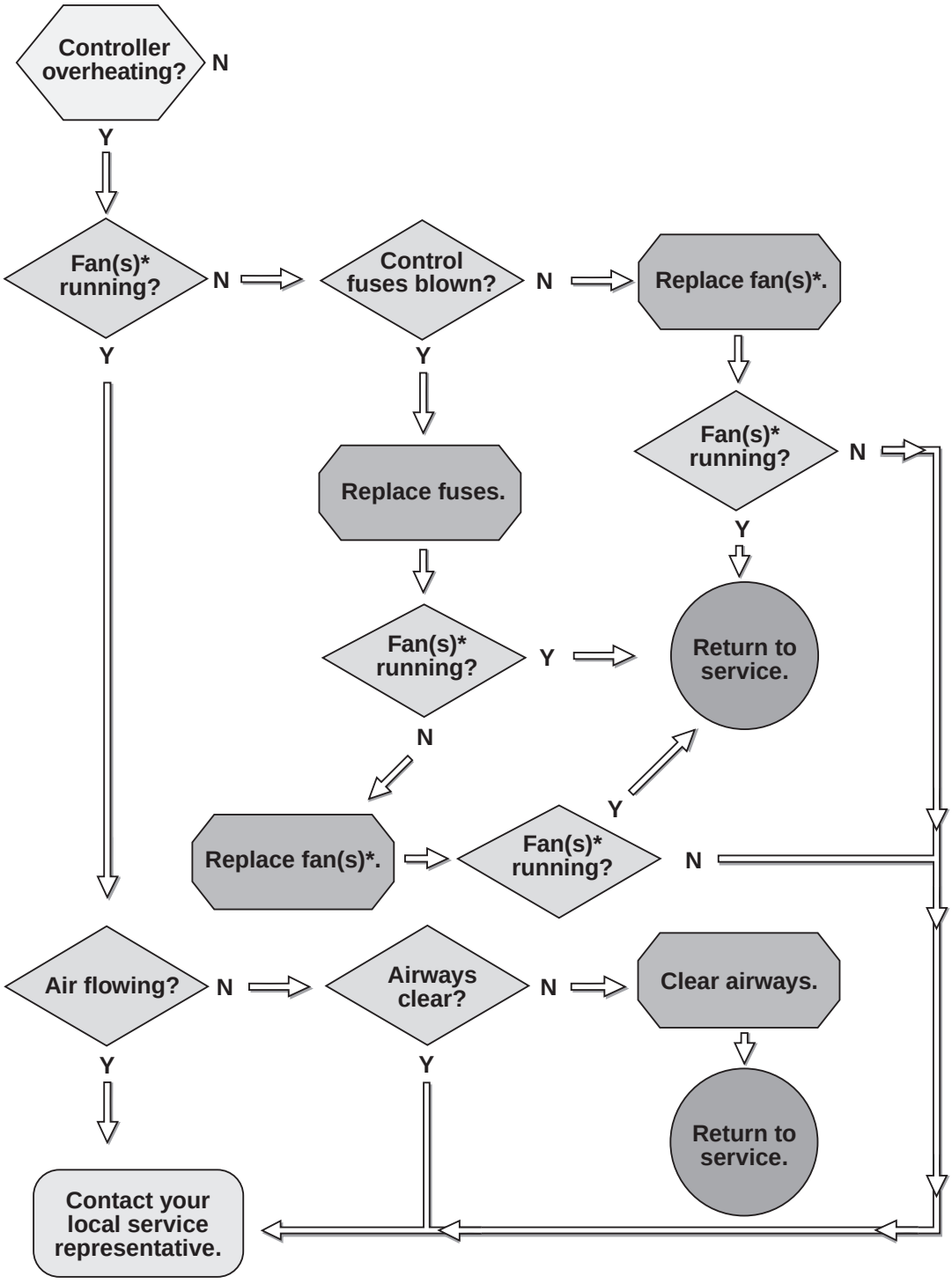
Troubleshooting: Drive Is Overheating

The following flow chart demonstrates necessary steps to take if the drive is overheating .



* Check fan(s) or motorized impeller inside of drive and fans on the heat exchanger (if any).

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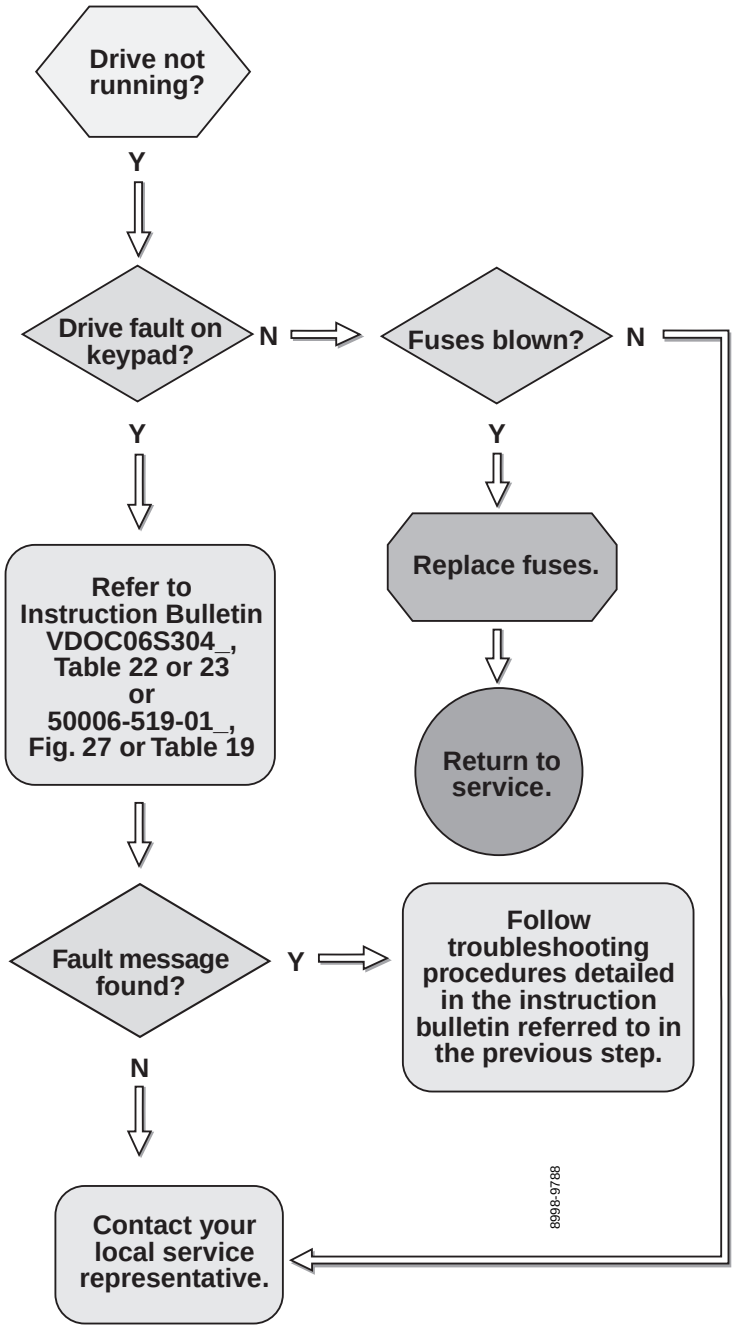
Troubleshooting: Drive Will Not Run

The following flow chart demonstrates necessary steps to take if the drive will not run.



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SECTION 7—SPARE PARTS

This section details the spare parts available for ALTIVAR drive controller units in MCCs. For spare parts specific to the ALTIVAR 66 drive controller, refer to Table 24 in the *ALTIVAR 66 Receiving, Installation, and Start-Up Instruction Manual* (VDOC06S304_) or Appendix C in the ALTIVAR 56 *User's Manual* (50006-519-01_). For power fuse recommendation and location, refer to Table 2 on page 16 of this manual.

Table 3: Disconnect Switch Assemblies (SW)

Description			Drive Controller	Square D Part Number
CT or VT (low noise) HP at 460 V	VT HP at 460 V	Drive Frame Size		
1, 2, and 3	1, 2, and 3	1	ATV66U41N4U	40512-722-50
—	5	1	ATV66U54N4U	40512-722-50
5	—	1	ATV66U72N4U	40512-722-50
7.5	7.5	2	ATV66U90N4U	40512-722-50
—	10	2	ATV66U90N4U	40512-722-50
10	—	2	ATV66D12N4U	40512-722-50
15	15	3	ATV66D16N4U	80442-210-50
—	20	3	ATV66D16N4U	80442-210-50
20	—	3	ATV66D23N4U	80442-210-50
25/30	25/30	4	ATV66D33N4U	M6DSAFS100M
—	40	4	ATV66D33N4U	M6DSAFS100M
40	—	4	ATV66D46N4U	M6DSAFS100M
50	50/60	5	ATV66D54N4U	KHL36000M
60	75	5	ATV66D64N4U	KHL36000M
75	—	5	ATV66D79N4U	KHL36000M
100①	100	6	ATV66C10N4U	KAL36250-26M
—	125	6	ATV66C10N4U	KAL36250-30M
125①	—	6	ATV66C13N4U	KAL36250-30M
—	150	6	ATV66C13N4U	LAL36400-32M
150①	—	6	ATV66C15N4U	LAL36400-32M
—	200	6	ATV66C15N4U	LAL36400-35M
200①	—	6	ATV66C19N4U	LAL36400-35M

① VT (low noise) not available.

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Table 4: Circuit Breaker Disconnect Assemblies (BKR)

Description			Drive Controller	Square D Part Number
CT or VT (low noise) HP	VT HP	Drive Frame Size		
1 and 2	1 and 2	1	ATV66U41N4U	GJL36007MO2
3	3	1	ATV66U41N4U	GJL36015MO3
—	5	1	ATV66U54N4U	GJL36015MO3
5	—	1	ATV66U72N4U	GJL36015MO3
7.5	7.5/10	2	ATV66U90N4U	GJL36030MO4
10	—	2	ATV66D12N4U	GJL36030MO4
15	15/20	3	ATV66D16N4U	80442-208-50
20	—	3	ATV66D23N4U	80442-208-50
25	25	4	ATV66D33N4U	80442-209-50
30	30 and 40	4	ATV66D33N4U	M6DSAMG100M18Y532
40	—	4	ATV66D46N4U	M6DSAMG100M18Y532
50	50	5	ATV66D54N4U	KAL36250-25M KCL34125②
—	60	5	ATV66D54N4U	KAL36250-25M KCL34150②
60	—	5	ATV66D64N4U	KAL36250-25M KCL34150②
—	75	5	ATV66D64N4U	KAL36250-25M KCL34150②
75	—	5	ATV66D79N4U	KAL36250-25M KCL34175②
100①	100	6	ATV66C10N4U	KAL36250-26M KCL34225②
—	125	6	ATV66C10N4U	KAL36250-30M KCL34250②
125①	—	6	ATV66C13N4U	KAL36250-30M KCL34250②
—	150	6	ATV66C13N4U	LAL36400-32M LAL36350②
150①	—	6	ATV66C15N4U	LAL36400-32M LAL36350②
—	200	6	ATV66C15N4U	LAL36400-35M LAL36400②
200①	—	6	ATV66C19N4U	LAL36400-35M LAL36400②

① VT (low noise) not available.
② Integrated Bypass

Table 5: CL1 and CL2 Fuses

Description	Drive Controller	Replacement Fuse Catalog Number (Bussman)	Square D Part Number
FU	ATV66 All Sizes	KTK-R-3	25430-10300

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Table 6: Fan Fuses

Description	Drive Controller	Replacement Fuse Catalog Number (Bussman)	Square D Part Number
PRI (FU)	ATV66 with 50 VA CPT	FNQ-R-1/4	25430-20025
	ATV66 with 100 VA CPT	FNQ-R-1/2	25430-20050
	ATV66 with 150 VA CPT	FNQ-R-3/4	25430-20074
	ATV66 with 300 VA CPT	FNQ-R-1-6/10	25430-20161
	ATV66 with 500 VA CPT	FNQ-R-2-8/10	25430-20281
SEC (FF)	ATV66 with 50 VA CPT	FNQ-R-1/2	25430-20050
	ATV66 with 100 VA CPT	FNQ-R-8/10	25430-20080
	ATV66 with 150 VA CPT	FNQ-R-1-1/4	25430-20126
	ATV66 with 300 VA CPT	FNQ-R-2-1/2	25430-20250
	ATV66 with 500 VA CPT	FNQ-R-4	25430-20400

Table 7: Bulbs

Description	Rating	Drive Controller	Square D Part Number
Red LED	24 Vdc	ATV66 All Sizes	25501-03043
Green LED	24 Vdc	ATV66 All Sizes	25501-03044
Yellow LED	24 Vdc	ATV66 All Sizes	25501-03045
Pilot Lamp	120 Vac	ATV66 All Sizes	DL1CE130

Table 8: Air Movers

Description	Size (inches)	CFM	Manufacturer	Manufacturer Part Number	Square D Part Number
Axial Fans (Fan 1, 2)	3.14 X 3.14	34	Comair-Rotron	SU2A5	26016-31001
	4.69 X 4.69	115	Comair-Rotron	MX2A3	26016-31529
Motorized Impeller (Fan 3)	7.48 diameter	365	EBM Industries	R2E190-AE50-29	26016-31532

Table 9: Pilot Devices

Description	Rating	Square D Part Number
Potentiometer (MSP)	2.5 Kohms	80442-273-01
MMIR (IR)	24 Vdc	80442-247-50

Table 10: Control Transformers

Diagram Designation	Rating	Square D Part Number
(TRANS)	50 VA	9070EL1D9
	100 VA	9070EL2D9
	150 VA	9070EL3D9

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Table 10: Control Transformers

Diagram Designation	Rating	Square D Part Number
	300 VA	9070KL300D9
	500 VA	9070K500D1
	750 VA	9070K750D1
	1000 VA	9070K1000D1

Table 11: Heat Exchanger

Description	Drive Controller	Square D Part Number
Heat Exchanger, complete	Frame Size 2–3 only	26499-34292
Heat Exchanger, fans	Frame Size 2–3 only	Thermacore: 0000331
Fan Straightening Tool	Frame Size 2–3 only	McMaster-Carr: 1727 K13

Table 12: Inlet Duct Filter Kit ①②

Description	Square D Part Number
Frame Size 4	80442-775-50
Frame Size 5	80442-775-51
Frame Size 6	80442-775-52

① Applied only to Frame Sizes 4–6.
② Filter Kit includes mounting bracket, filter element, and mounting hardware.

Table 13: Filter Element ①

Description	Square D Part Number
Frame Size 4	80442-630-03
Frame Size 5	80442-630-02
Frame Size 6	80442-630-01

① Includes filter element only.

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APPENDIX A—SAMPLE ALTIVAR PARAMETER SHEET

MENU INDEX NO.	PARAMETER NAME	SETTINGS BY MCC FACTORY
6.1	TORQUE TYPE	VARIABLE (VT)
6.2	COMMAND TYPE	2 WIRE (Maintained)
7.2	SPEED REF 1	AI1
7.2	SPEED REF 2	AI2 4-20mA
7.2	AUTO/MANUAL	YES, LOGIC IN:LI5 AUTO RUN = LI6
7.2	CONTROLLED STOP	BY LOGIC INPUT = LI7 ACTIVE STATE = LOW STOP TYPE = FREE
7.2	BYPASS	YES DEFINE I/O SEQUENCE INPUT = LI8 RUN OUT. COMMAND = R2
7.3	FAULT STATE	LO2
7.3	MOTOR SPEED	AO1 SELECT 0-20mA
7.4	FAULT RESET	LI4

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APPENDIX B—FIELD WIRING TERMINATION DRAWINGS

Table 20: Field Wire Termination Chart for Basic Frame Size 1 ALTIVAR Drive Controller in Square D MCCs (see Figure 32)
1–5 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
1–5 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in/N•m)	Maximum Wire Size (AWG/mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	20 / —	#10/—	75° C CU	SW2	600 V	All
L1, L2, L3	Power Converter	7 / 0.76	#10 / 2.5	75° C CU	SW2	600 V	All
T1, T2, T3	Power Converter	7 / 0.76	#10 / 2.5	75° C CU	PW1	600 V	All
PA, PB	Power Converter	7 / 0.76	#10 / 2.5	75° C CU	PW1	600 V	All
Any	Power Converter J1	3.5 / 0.4	#14 / 2.5	75° C CU	SW1	150 V / 300 V	All
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 2.5	75° C CU	QW2	30 V	All
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 2.5	75° C CU	QW1	30 V	All
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	SW1	150 V	All
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW1	30 V	All
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW2	30 V	All

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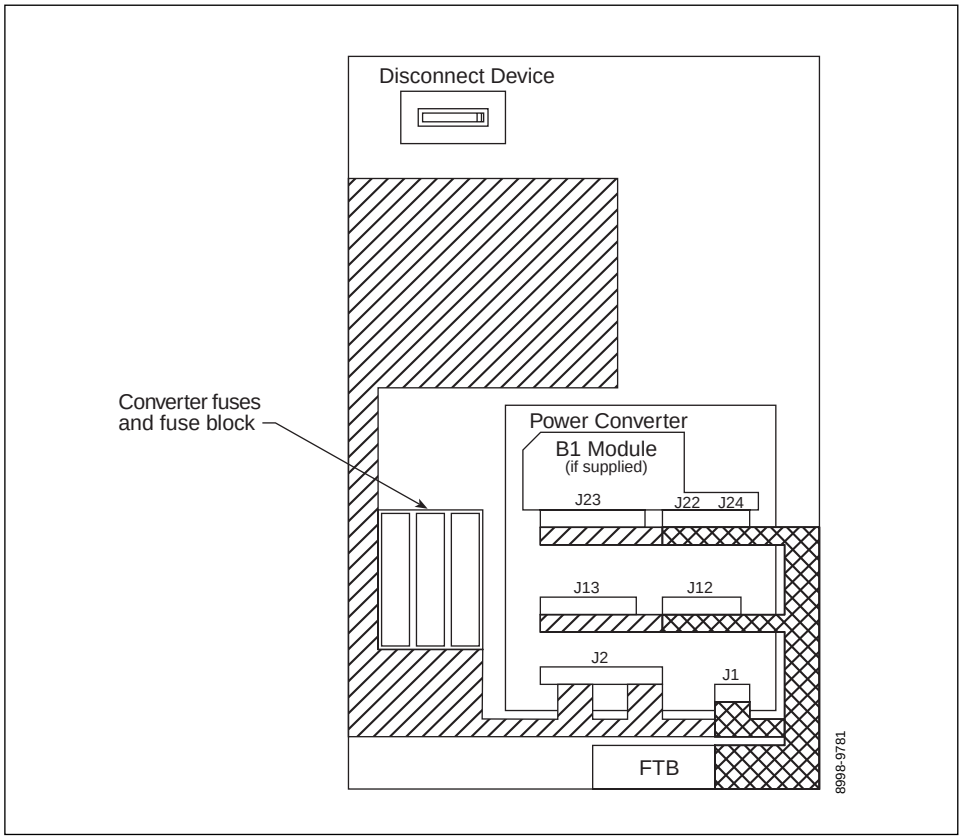

Figure 32: Field Wire Termination Diagram for Basic Frame Size 1 ALTIVAR Drive Controller in Square D MCCs

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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Table 21: Field Wire Termination Chart for Frame Size 1 ALTIVAR Drive Controller with Extended Options in Square D MCCs (see Figure 33 on page 49)
1–5 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
1–5 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in/N•m)	Maximum Wire Size (AWG/mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	20/—	#10/—	75° C CU	SW2	600 V	All
L1, L2, L3	Power Converter	7/0.76	#10 / 2.5	75° C CU	SW2	600 V	All
T1, T2, T3	Power Converter	7/0.76	#10 / 2.5	75° C CU	PW1	600 V	All
PA, PB	Power Converter	7/0.76	#10 / 2.5	75° C CU	PW1	600 V	All
T1, T2, T3	Iso/Bypass Starter or Isolation Contactor (if applicable)	15/—	#8/—	75° C CU	PW1	600 V	All
L1, L2, L3	Line Contactor (if applicable)	15/—	#8/—	75° C CU	SW2	600 V	All
Any	Power Converter J1	3.5 / 0.4	#14 / 2.5	75° C CU	SW1	150 V / 300 V	All
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 2.5	75° C CU	QW2	30 V	All
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 2.5	75° C CU	QW1	30 V	All
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	SW1	150 V	All
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW1	30 V	All
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW2	30 V	All

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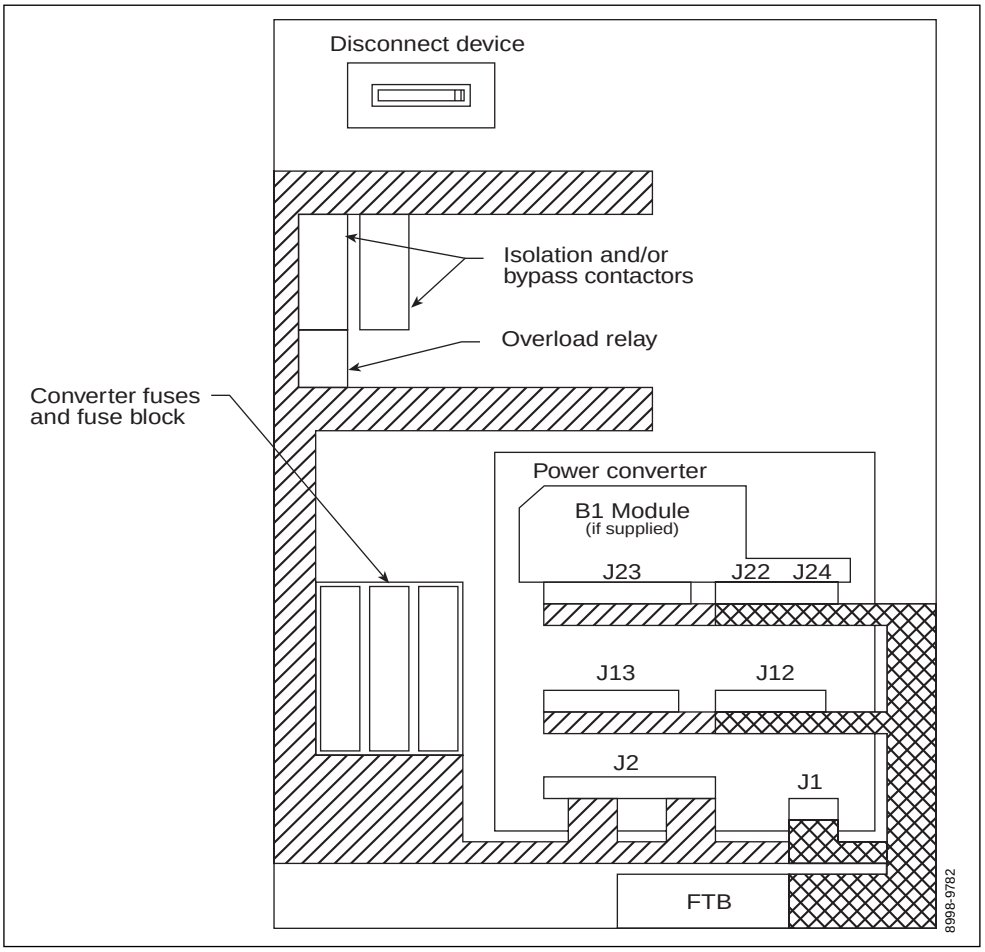

Figure 33: Field Wire Termination Diagram for Frame Size 1 ALTIVAR Drive Controller with Extended Option in Square D MCCs

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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Table 22: Field Wire Termination Chart for Basic Frame Size 2 ALTIVAR Drive Controller in Square D MCCs
7.5–10 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
7.5–10 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in / N•m)	Maximum Wire Size (AWG / mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	20 / —	#10 / —	60° C CU-AL	SW2	600 V	All Above
L1, L2, L3	Power Converter	36 / 4	#6 / 10	75° C CU	SW2	600 V	All Above
T1, T2, T3	Power Converter	36 / 4	#6 / 10	75° C CU	PW1	600 V	All Above
PA, PB	Power Converter	36 / 4	#6 / 10	75° C CU	PW1	600 V	All Above
Any	Power Converter J1	3.5 / 0.4	#14 / 2.5	75° C CU	SW1	150 V / 300 V	All Above
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 2.5	75° C CU	QW2	30 V	All Above
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 2.5	75° C CU	QW1	30 V	All Above
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	SW1	150 V	All Above
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW1	30 V	All Above
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW2	30 V	All Above

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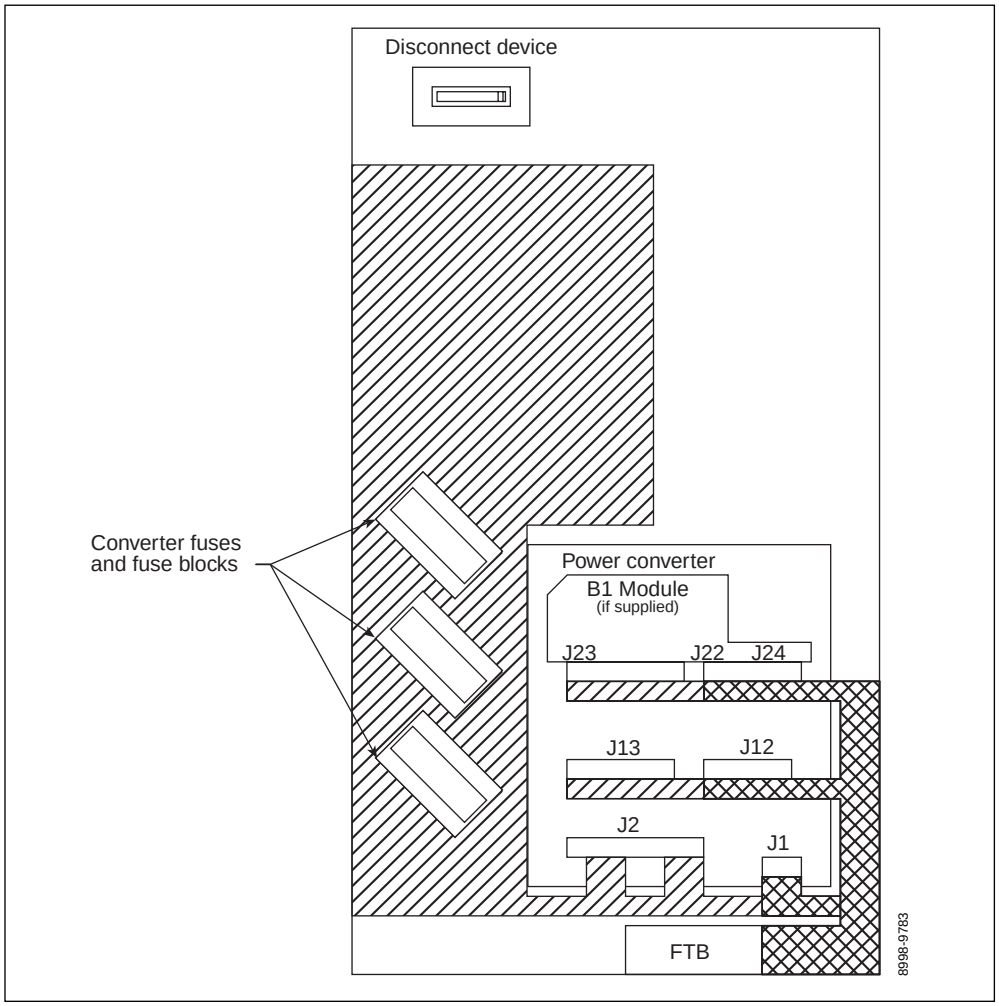

Figure 34: Field Wire Termination Diagram for Basic Frame Size 2 ALTIVAR Drive Controller in Square D MCCs

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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Table 23: Field Wire Terminations for Frame Size 2 ALTIVAR Drive Controller with Extended Options in Square D MCCs (see Figure 35 on page 53)
7.5–10 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
7.5–10 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in / N•m)	Maximum Wire Size (AWG / mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	20 / —	#10 / —	60° C CU	SW2	600 V	All Above
L1, L2, L3	Power Converter	36 / 4	#6 / 10	75° C CU	SW2	600 V	All Above
T1, T2, T3	Power Converter	36 / 4	#6 / 10	75° C CU	PW1	600 V	All Above
PA, PB	Power Converter	36 / 4	#6 / 10	75° C CU	PW1	600 V	All Above
T1, T2, T3	Iso/Bypass Starter or Isolation Contactor (if applicable)	15 / —	#8 / —	75° C CU	PW1	600 V	All Above
L1, L2, L3	Line Contactor (if applicable)	15 / —	#8 / —	75° C CU	SW2	600 V	All Above
Any	Power Converter J1	3.5 / 0.4	#14 / 2.5	75° C CU	SW1	150 V / 300 V	All Above
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 2.5	75° C CU	QW2	30 V	All Above
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 2.5	75° C CU	QW1	30 V	All Above
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	SW1	150 V	All Above
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW1	30 V	All Above
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW2	30 V	All Above

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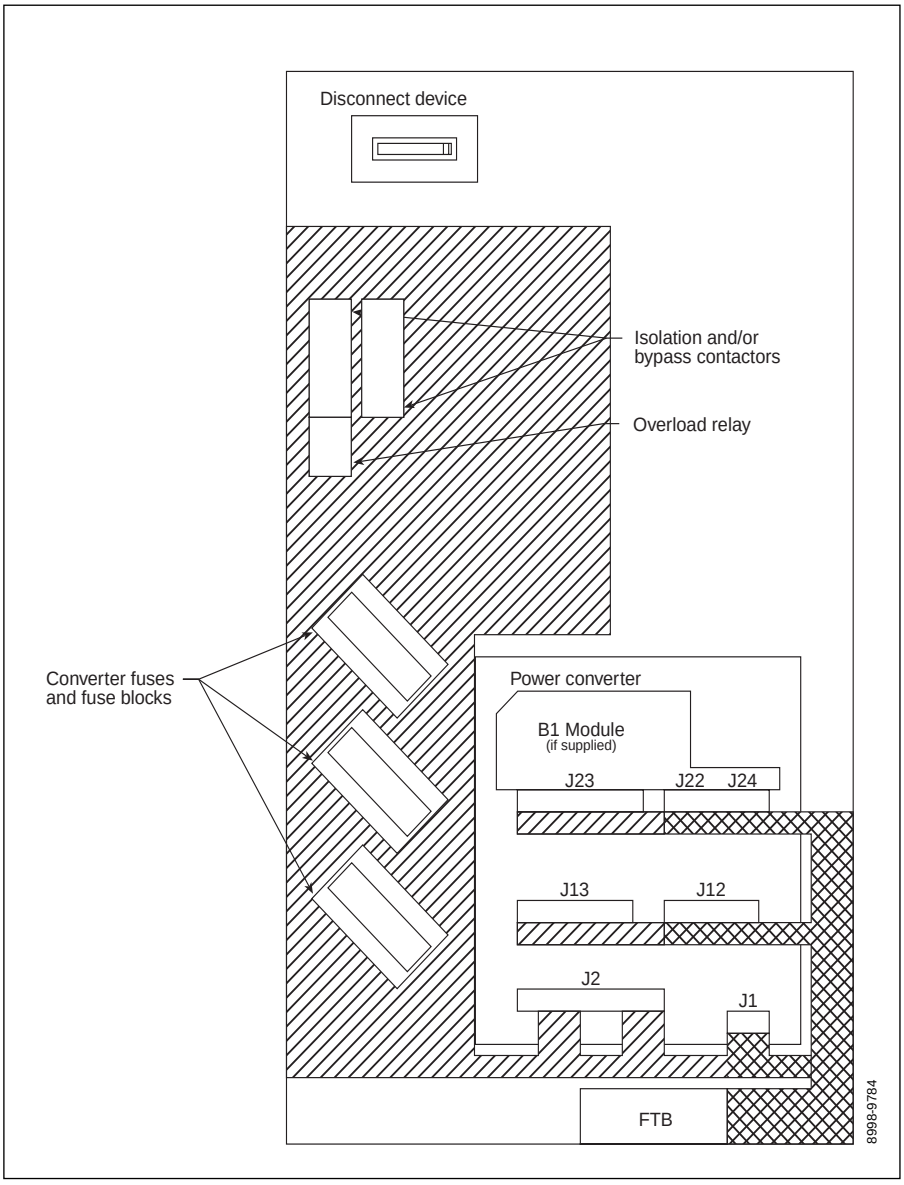

Figure 35: Field Wire Termination Diagram for Frame Size 2 ALTIVAR Drive Controller with Extended Options in Square D MCCs

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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Table 24: Field Wire Termination Chart for Basic Frame Size 3 ALTIVAR Drive Controller in Square D MCCs
15–20 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
15–20 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in / N•m)	Maximum Wire Size (AWG / mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	50 / — 45 / — 40 / —	#2/0–#30 / — #4–#6 / — #8 / —	60° C CU-AL	SW2	600 V	All Above
L1, L2, L3	Power Converter	18 / 2	#4 / 10	75° C CU	SW2	600 V	All Above
T1, T2, T3	Power Converter	18 / 2	#4 / 10	75° C CU	PW1	600 V	All Above
PA, PB	Power Converter	11 / 1.2	#8 / 6	75° C CU	PW1	600 V	All Above
Any	Power Converter J1	3.5 / 0.4	#14 / 2.5	75° C CU	SW1	150 V / 300 V	All Above
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 2.5	75° C CU	QW2	30 V	All Above
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 2.5	75° C CU	QW1	30 V	All Above
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	SW1	150 V	All Above
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW1	30 V	All Above
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW2	30 V	All Above

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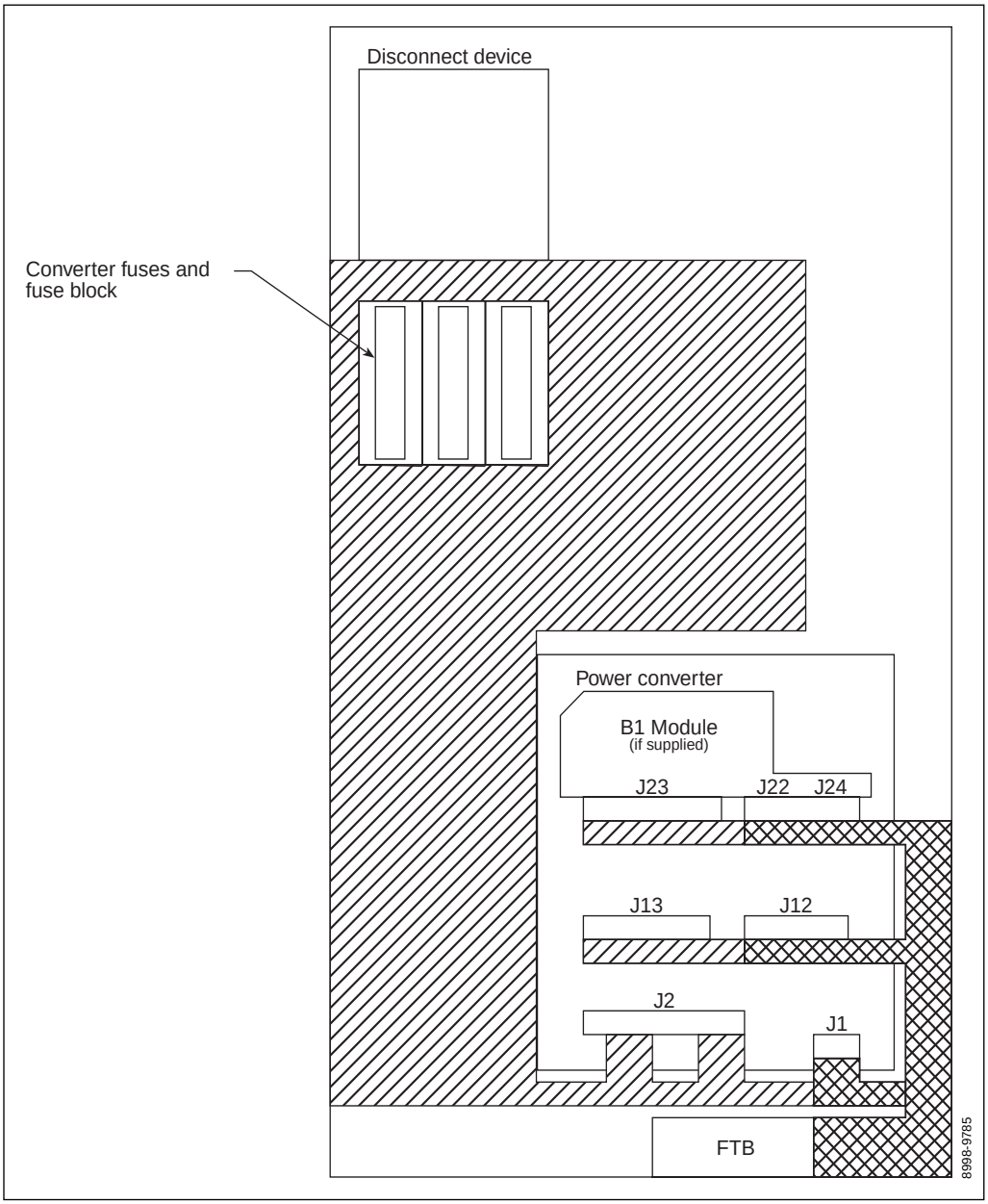

Figure 36: Field Wire Termination Diagram for Basic Frame Size 3 ALTIVAR Drive Controller in Square D MCCs

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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Table 25: Field Wire Terminations for Frame Size 3 ALTIVAR Drive Controller with Extended Options in Square D MCCs (see Figure 37 on page 57)
15–20 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
15–20 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in / N•m)	Maximum Wire Size (AWG / mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	50 / — 45 / — 40 / —	#2/0–#30 / — #4–#6 / — #8 / —	60° C CU-AL	SW2	600 V	All Above
L1, L2, L3	Power Converter	18 / 2	#4 / 10	75° C CU	SW2	600 V	All Above
T1, T2, T3	Power Converter	18 / 2	#4 / 10	75° C CU	PW1	600 V	All Above
PA, PB	Power Converter	11 / 1.2	#8 / 6	75° C CU	PW1	600 V	All Above
T1, T2, T3	Iso/Bypass Starter or Isolation Contactor (if applicable)	15 / — 20 / —	#8 / — #6 / —	75° C CU	PW1	600 V	15 HP 20 HP
L1, L2, L3	Line Contactor (if applicable)	15 / —	#8 / —	75° C CU	SW2	600 V	All Above
Any	Power Converter J1	3.5 / 0.4	#14 / 2.5	75° C CU	SW1	150 V / 300 V	All Above
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 2.5	75° C CU	QW2	30 V	All Above
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 2.5	75° C CU	QW1	30 V	All Above
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	SW1	150 V	All Above
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW1	30 V	All Above
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW2	30 V	All Above

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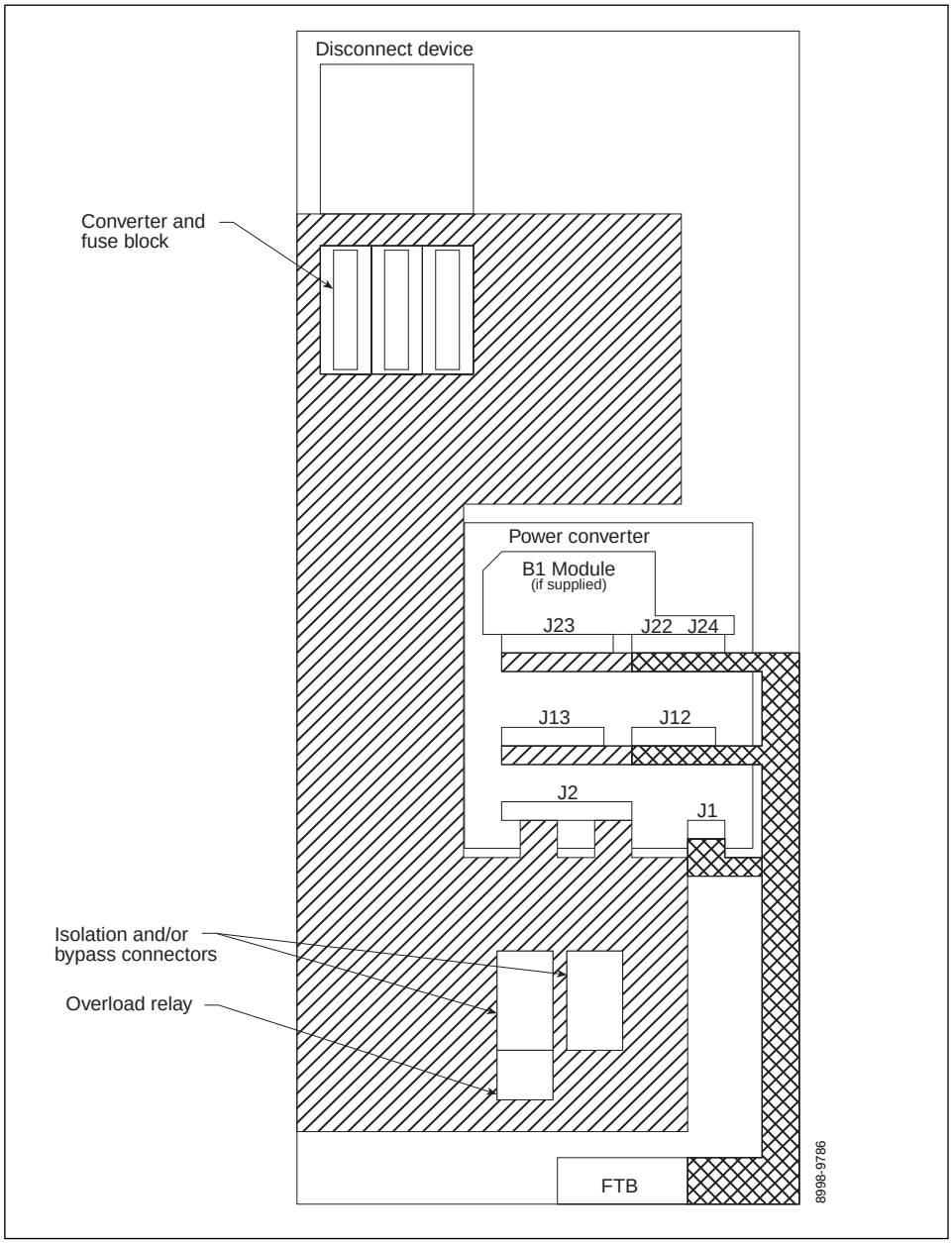

Figure 37: Field Wire Termination Diagram for Frame Size 3 ALTIVAR Drive Controller with Extended Options in Square D MCCs

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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Table 26: Field Wire Termination Chart for Basic Frame Size 4 ALTIVAR Drive Controller in Square D MCCs (see Figure 38 on page 59)
25–40 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
25–40 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in / N•m)	Maximum Wire Size (AWG / mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	375 / —	250 kcmil	60°/75° C CU-AL	SW2	600 V	All Above
L1, L2, L3	Power Converter	27 / 3	#2/0 / 35	75° C CU	SW2	600 V	All Above
T1, T2, T3	Power Converter	27 / 3	#2/0 / 35	75° C CU	PW1	600 V	All Above
PA, PB	Power Converter	18 / 2	#4 / 16	75° C CU	PW1	600 V	All Above
Any	Power Converter J1	3.5 / 0.4	#14 / 2.5	75° C CU	SW1	150 V / 300 V	All Above
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 2.5	75° C CU	QW2	30 V	All Above
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 2.5	75° C CU	QW1	30 V	All Above
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	SW1	150 V	All Above
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW1	30 V	All Above
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW2	30 V	All Above

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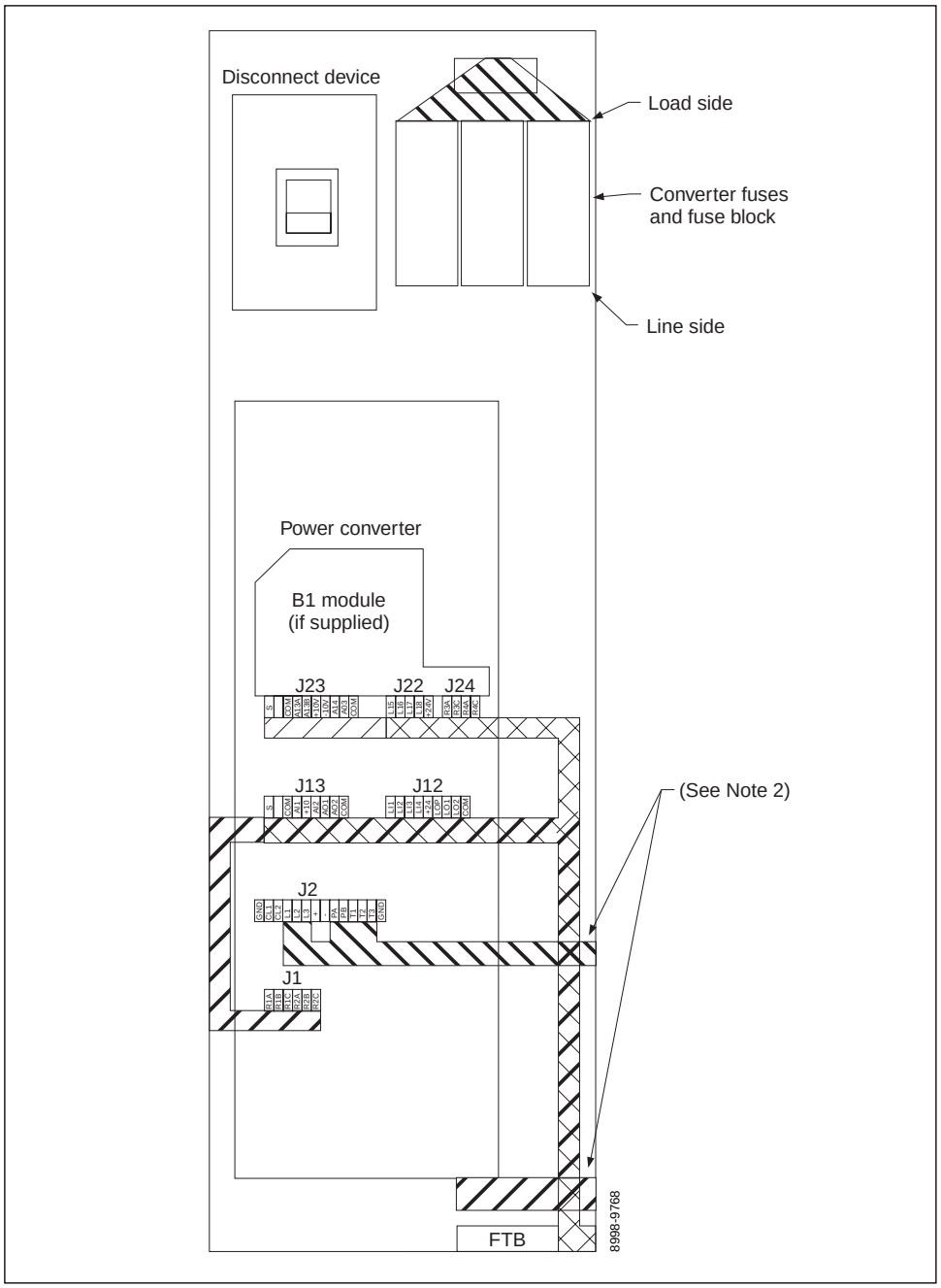

Figure 38: Field Wire Termination Diagram for Basic Frame Size 4 ALTIVAR Drive Controller in Square D MCCs

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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Table 27: Field Wire Terminations for Frame Size 4 ALTIVAR Drive Controller with Extended Options in Square D MCCs (see Figure 39 on page 61)
25–40 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
25–40 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in / N•m)	Maximum Wire Size (AWG / mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	375 / —	250 kcmil	60° / 75° C CU-AL	SW2	600 V	All Above
L1, L2, L3	Power Converter	27 / 3	#2/0 / 35	75° C CU	SW2	600 V	All Above
T1, T2, T3	Power Converter	27 / 3	#2/0 / 35	75° C CU	PW1	600 V	All Above
PA, PB	Power Converter	18 / 2	#4 / 16	75° C CU	PW1	600 V	All Above
T1, T2, T3	Iso/Bypass Starter or Isolation Contactor (if applicable)		#3 / — #2 / —	75° C CU 75° C CU	PW1	600 V	All Above
L1, L2, L3	Line Contactor (if applicable)	35 / —	#3 / —	75° C CU	SW2	600 V	All Above
Any	Power Converter J1	3.5 / 0.4	#14 / 2.5	75° C CU	SW1	150 V / 300 V	All Above
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 2.5	75° C CU	QW2	30 V	All Above
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 2.5	75° C CU	QW1	30 V	All Above
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	SW1	150 V	All Above
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW1	30 V	All Above
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.6	#12 / 2.5	75° C CU	QW2	30 V	All Above

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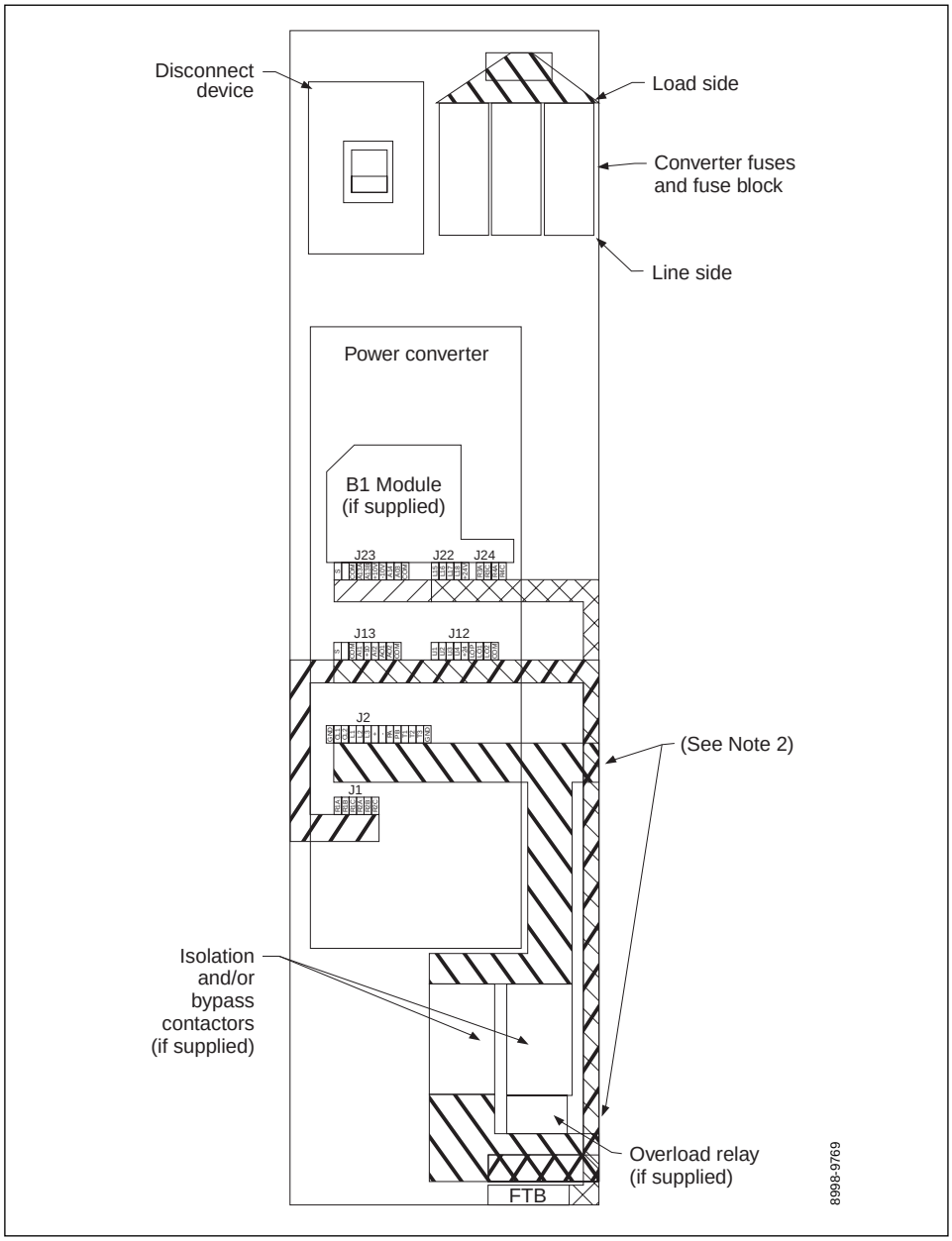

Figure 39: Field Wire Termination Diagram for Frame Size 4 ALTIVAR Drive Controller with Extended Options in Square D MCCs

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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Table 28: Field Wire Termination Chart for Basic Frame Size 5 Drive Controller in Square D MCCs (see Figure 40 on page 63)
50–75 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
50–75 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in/N•m)	Maximum Wire Size (AWG/mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	375 / 43	250 kcmil	60° / 75° C CU-AL	SW2	600 V	All
L1, L2, L3	Power Converter	70 / 9①	#2 / 35①	75° C CU	SW2	600 V	All
T1, T2, T3	Power Converter	70 / 9①	#2 / 35①	75° C CU	PW1	600 V	All
PA, PB	Power Converter	27 / 3	#2 / 35	75° C CU	PW1	600 V	All
Any	Power Converter J1	3.5 / 0.4	#14 / 1.5	75° C CU	SW1	150 V / 300 V	All
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 1.5	75° C CU	QW2	30 V	All
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 1.5	75° C CU	QW1	30 V	All
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.57	#14 / 1.5	75° C CU	SW1	150 V	All
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.57	#14 / 1.5	75° C CU	QW1	30 V	All
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.57	#14 / 1.5	75° C CU	QW2	30 V	All

① Recommended wire sizes and torque. The maximum wire size is #4/0 AWG / 70 mm^2 and the recommended torque for this wire size is 170 lb-in / 19 N•m.

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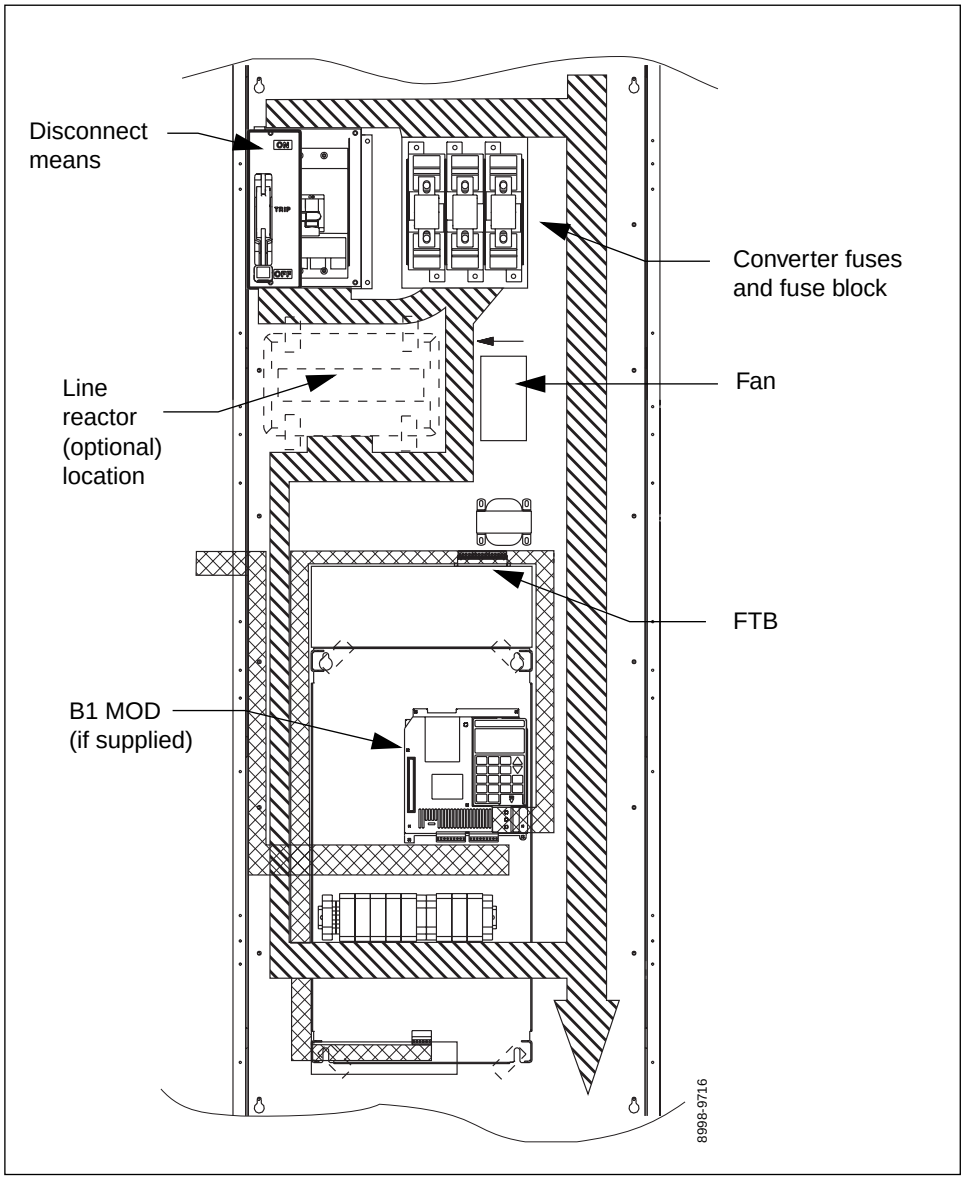

Figure 40: Field Wire Termination for Basic Frame Size 5 ALTIVAR Drive Controller in Square D MCCs

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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Table 29: Field Wire Termination for Frame Size 5, ALTIVAR Drive Controller with Extended Options in MCCs (see Figure 41 on page 65 and Figure 42 on page 66)
50–75 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
50–75 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in/N•m)	Maximum Wire Size (AWG/mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	375 / 43	250 MCM	60° / 75° C CU-AL	SW2	600 V	All
L1, L2, L3	Power Converter	70 / 9①	#2 / 35①	75° C CU	SW2	600 V	All
T1, T2, T3	Power Converter	70 / 9①	#2 / 35①	75° C CU	PW1	600 V	All
PA, PB	Power Converter	27 / 3	#2 / 35	75° C CU	PW1	600 V	All
T1, T2, T3	Iso/Bypass Starter of Isolation Contactor (if applicable)	35 / 4	#3 / —	75° C CU	PW1	600 V	50–60 HP
		88 / 10	#1 / —	75° C CU	PW1	600 V	75 HP
L1, L2, L3	Line Contactor (if applicable)	88 / 10	2/0 / —	75° C CU	SW2	600 V	50–60 HP
		159 / 18	3/0 / —	75° C CU	SW2	600 V	75 HP
Any	Power Converter J1	3.5 / 0.4	#14 / 1.5	75° C CU	SW1	150 V / 300 V	All
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 1.5	75° C CU	QW2	30 V	All
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 1.5	75° C CU	QW1	30 V	All
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.57	#14 / 1.5	75° C CU	SW1	150 V	All
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.57	#14 / 1.5	75° C CU	QW1	30 V	All
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.57	#14 / 1.5	75° C CU	QW2	30 V	All

① These are recommended wire sizes and torque. The maximum wire size is #4/0 AWG / 70 mm^2 and the recommended torque for this wire size is 170 lb-in / 19 n•m.

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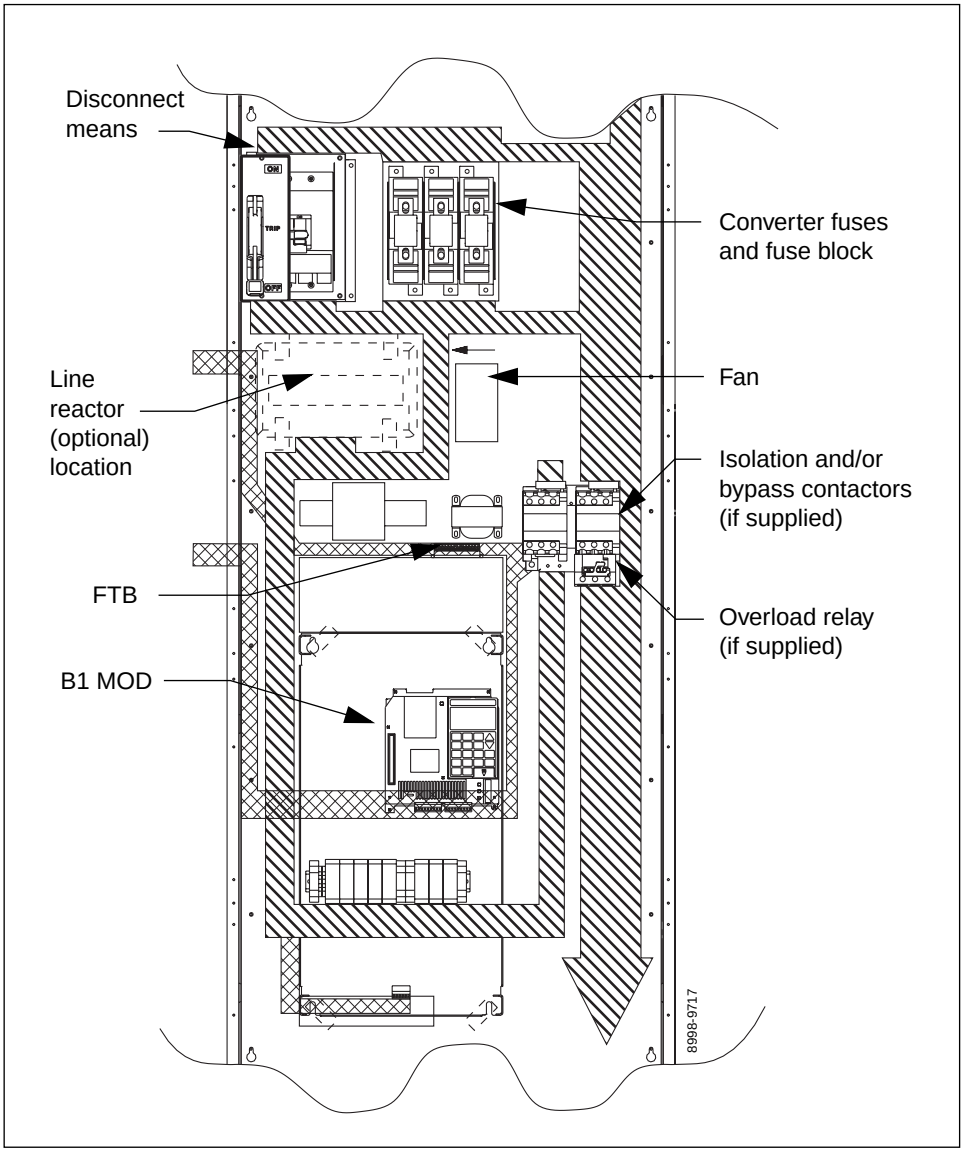

Figure 41: Field Wire Termination for Frame Size 5, ALTIVAR Drive Controller with Extended Options in Square D MCCs (Table 29 on page 64)

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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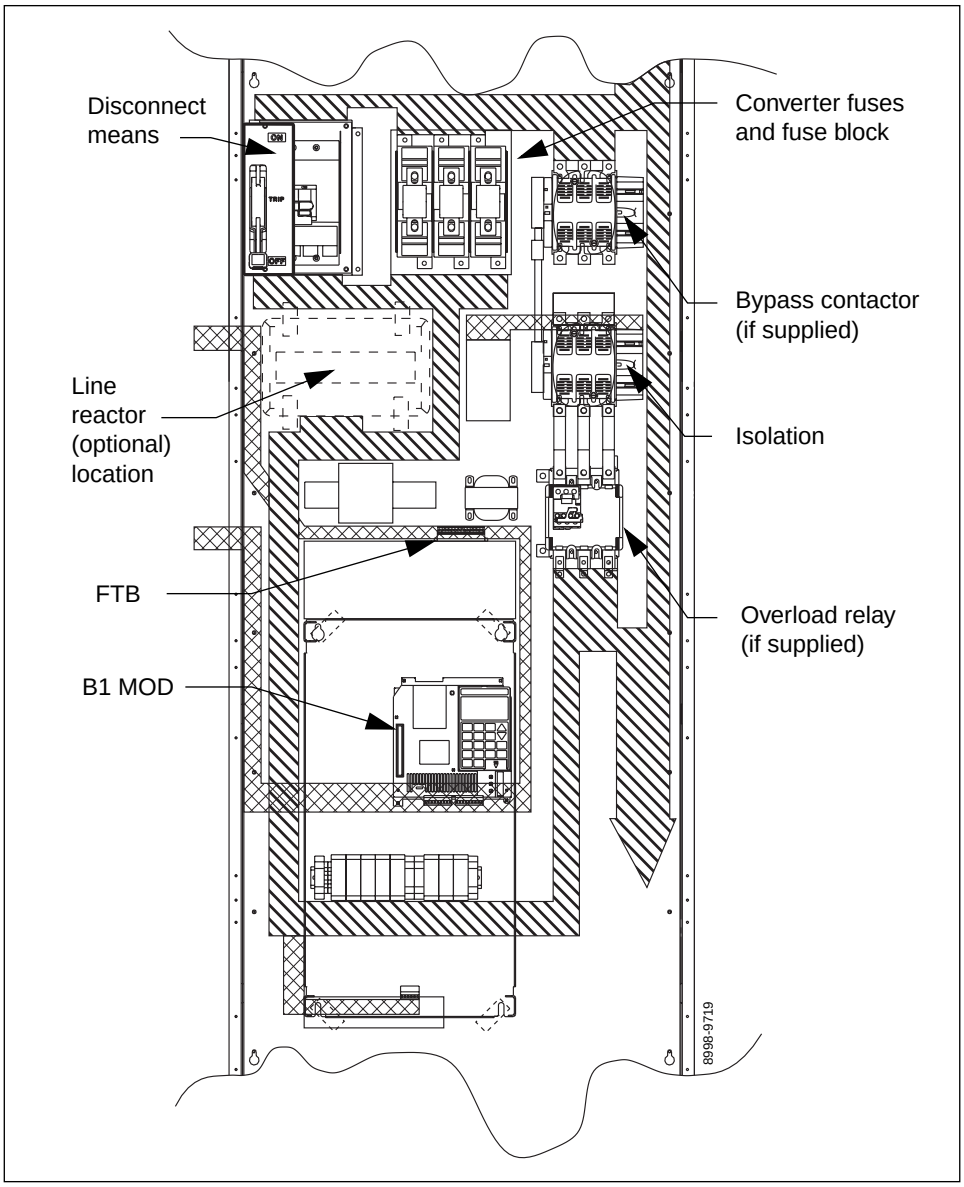

Figure 42: Field Wire Termination for Frame Size 5 ALTIVAR Drive Controller with Extended Options in Square D MCCs (Table 29 on page 64)

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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Table 30: Field Wire Termination Chart for Basic Frame Size 6 ALTIVAR Drive Controller in MCCs (see Figure 43 on page 68)
100–200 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
100–200 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in/N•m)	Maximum Wire Size (AWG/mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	148 / 16.8	250 kcmil	N/A	SW2	600 V	All
L1, L2, L3	Power Converter	325 / 36.7	350 kcmil / 185	75° C CU	SW2	600 V	100–125 HP
		375 / 42.4	2–300 kcmil / 2–150	75° C CU	SW2	600 V	150–200 HP
T1, T2, T3	Power Converter	325 / 36.7	350 kcmil / 185	75° C CU	PW1	600 V	All
PA, PB	Power Converter	50 / 5.6	1/0 / 50	75° C CU	PW1	600 V	All
Any	Power Converter J1	3.5 / 0.4	#14 / 1.5	75° C CU	SW1	150 V / 300 V	All
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 1.5	75° C CU	QW2	30 V	All
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 1.5	75° C CU	QW1	30 V	All
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.57	#14 / 1.5	75° C CU	SW1	150 V	All
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.57	#14 / 1.5	75° C CU	QW1	30 V	All
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.57	#14 / 1.5	75° C CU	QW2	30 V	All

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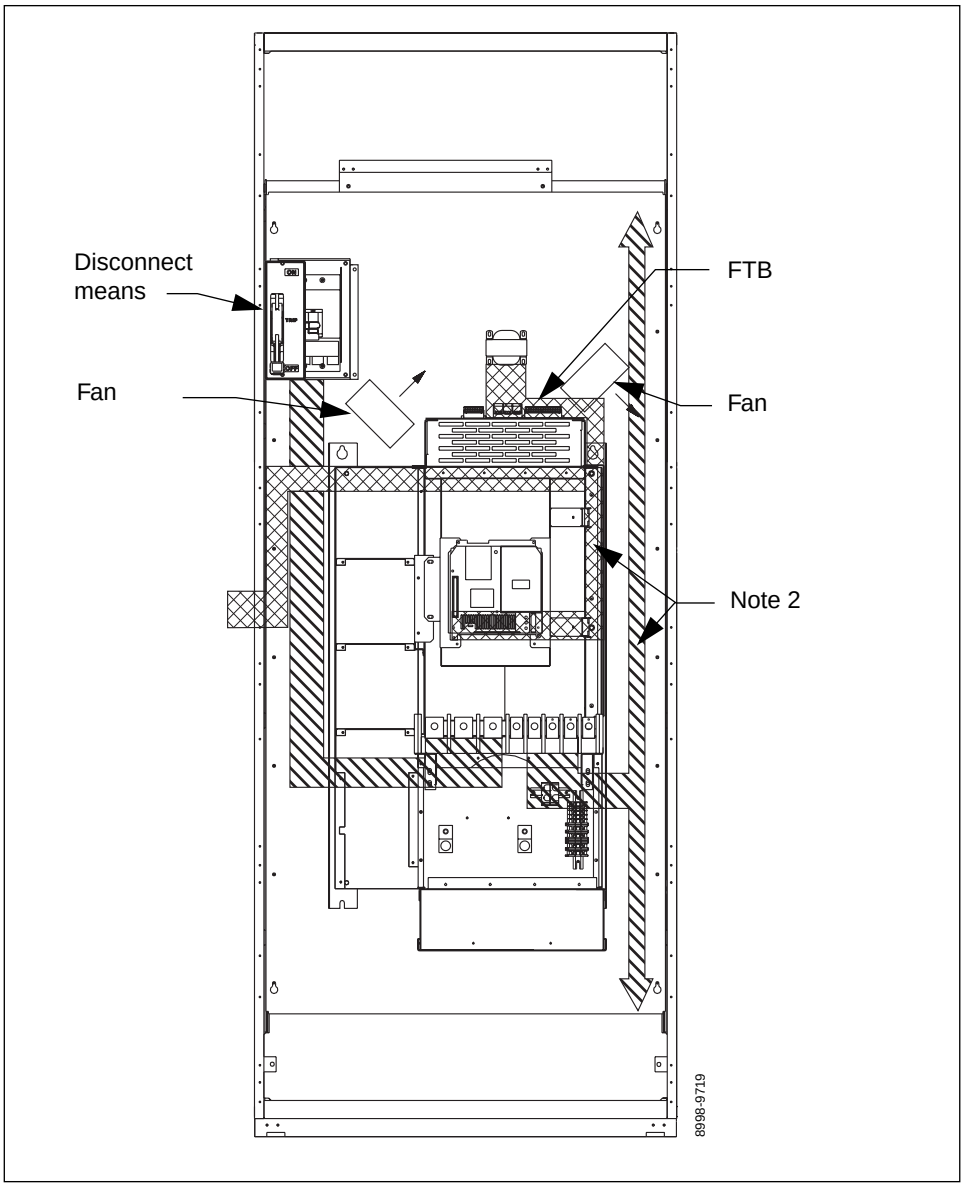

Figure 43: Field Wire Termination for Basic Frame Size 6 ALTIVAR Drive Controller in MCCs (Table 30 on page 67)

QW1 (see Note 1)
SW1 (see Note 1)
QW2 (see Note 1)
SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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Table 31: Field Wire Termination for Frame Size 6 ALTIVAR 66 Drive Controller with Extended Options in MCCs (see Figure 44 on page 70)
100–200 HP at 460 Vac, Constant Torque (CT) and Variable Torque Low Noise (VTLN)
100–200 HP at 460 Vac, Variable Torque (VT)

Termination Designation	Device	Torque (lb-in/N•m)	Maximum Wire Size (AWG/mm^2)	Wire Class	Noise Class	Voltage Class	Applicable HP Ratings
T1, T2, T3	Converter Fuse Block	148 / 16.8	N/A	75° C CU-AL	SW2	600 V	All Above
L1, L2, L3	Power Converter	325 / 36.7	350 kcmil / 185	75° C CU	SW2	600 V	All Above
		375 / 42.4	2–300 kcmil / 2–150	75° C CU	SW2	600 V	All Above
T1, T2, T3	Power Converter	325 / 36.7	350 kcmil / 185	75° C CU	PW1	600 V	All Above
PA, PB	Power Converter	50 / 5.6	1/0 / 50	75° C CU	PW1	600 V	All Above
T1, T2, T3	Iso/Bypass Starter or Isolation Contactor (if applicable)	158 / 18	3/0 / —	75° C CU	PW1	600 V	100–150 HP
		308 / 35	250 kcmil / —	75° C CU	PW1	600 V	200 HP
L1, L2, L3	Line Contactor (if applicable)	158 / 18	2/0 / —	75° C CU	SW2	600 V	100 HP
		308 / 35	250 kcmil / —	75° C CU	SW2	600 V	125–200 HP
Any	Power Converter J1	3.5 / 0.4	#14 / 2.5	75° C CU	SW1	150 V / 300 V	All Above
Any	Power Converter J12, J22, J24	3.5 / 0.4	#14 / 2.5	75° C CU	QW2	30 V	All Above
Any	Power Converter J13, J23	3.5 / 0.4	#14 / 2.5	75° C CU	QW1	30 V	All Above
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block FTB	5 / 0.57	#14 / 2.5	75° C CU	SW1	150 V	All Above
C1, C2, C3 through Cn	Terminal Block FTB	5 / 0.57	#14 / 2.5	75° C CU	QW1	30 V	All Above
D1, D2, D3 through Dn	Terminal Block FTB	5 / 0.57	#14 / 2.5	75° C CU	QW2	30 V	All Above

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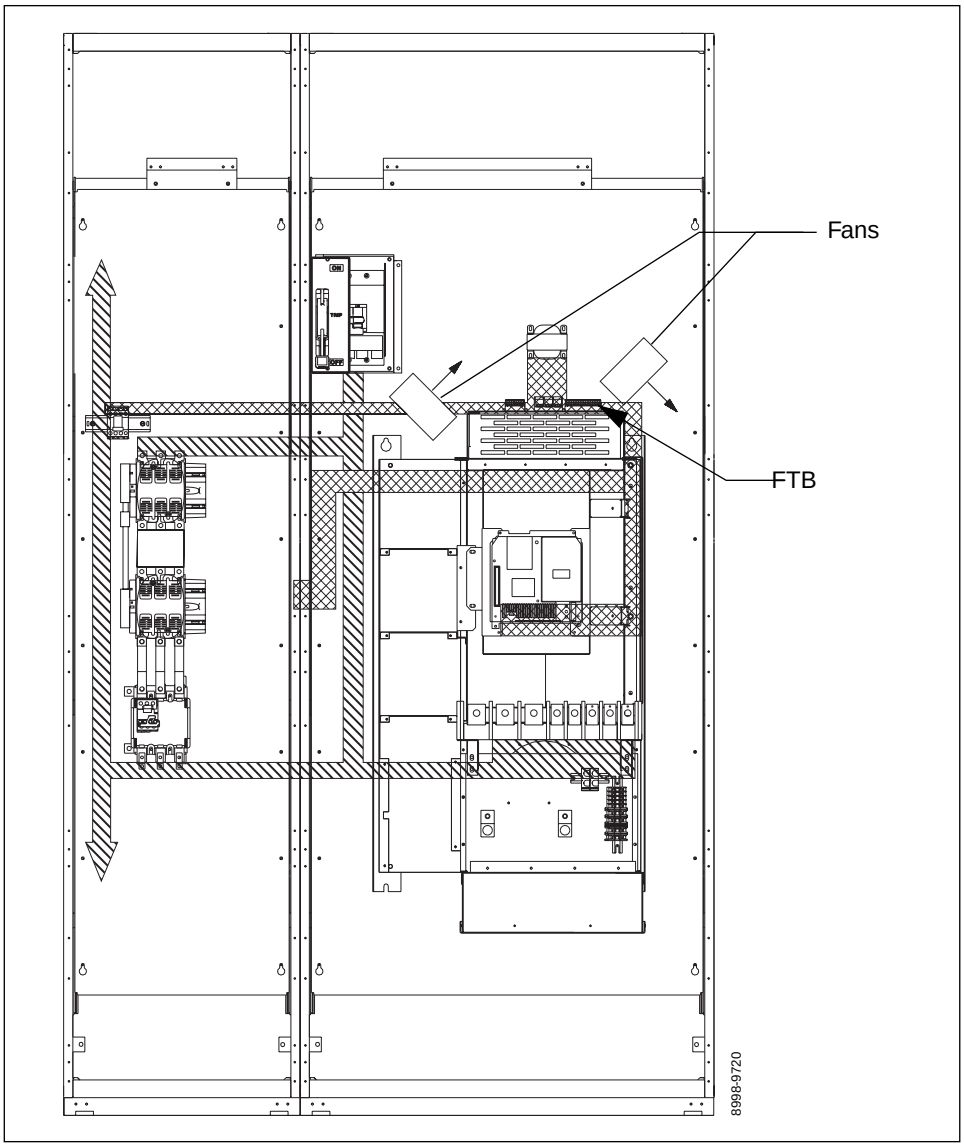

Figure 44: Field Wire Termination for Frame Size 6 ALTIVAR 66 Drive Controller with Extended Options in MCCs (Table 22 on page 50)

QW1 (see Note 1)

SW1 (see Note 1)

QW2 (see Note 1)

SW2, PW1 (see Note 1)

Notes: 1. For description, refer to **Wire Routing and Interconnection** in Section 4.

2. Arrange conductor groups depth-wise within unit and structure to maximize separation of each noise class.

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